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1985 National Database & 4th Generation Language Symposia

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Los Angeles
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Presented by Digital Consulting Associates, Inc.



The NATIONAL DATABASE & 4TH GENERATION LANGUAGE SYMPOSIUM is designed for those who need information on 4th Generation Languages, DBMS, software productivity tools, Information Centers, and/or prototyping. It features an intensive product-oriented discussion and seminar program showing how the new generation of software can be profitably used to build systems both for the DP Department and the end user in the Information Center.

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Dr. George Schumm, President, Digital Consulting Associates, Inc., is one of the best known and most widely respected lecturers on DBMS and 4th Generation Languages. Dr. Schumm will lead the Management Concepts Session on DAY 1 of the Symposium with the expertise and experience which prompted KIP INTERACE MAGAZINE to call him the "Guru of Data Base Management".

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OA

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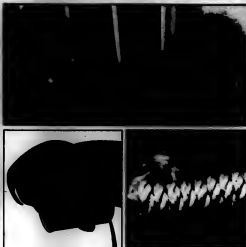
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BIG BROTHER,
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EDITORIAL

Nothing remains the same in the computer industry. The impetus for change is too strong and potential gains in revenue, productivity and quality of work too great for vendors, MIS managers or users to be satisfied with the status quo for very long.

Office automation, for example, is in some ways changing very rapidly and in others moving very slowly. Microcomputers have become the driving force in OA and have opened up vistas of information power to end users. The demand for more computing capacity has become insatiable.

The speed with which all this is happening is breathtaking. Until 1983, the equipment cost per factory worker exceeded that for a white-collar worker. Last year, for the first time, white-collar equipment costs — technology — outpaced that of factory workers, signifying a shift in the whole economy.

At the same time this demand for technology is rising, other factors are working against true OA. Overall planning is still uncommon; coordination of technology with business goals and procedures is rare; and training, ergonomics and implementation are too often glossed over, frequently to the detriment of the current and future system. OA has almost suffered from a lack of sharp definition — it can mean too many different things to too many different people. Although some of the technology is in place, it is not being utilized to full capacity. OA is not just a set of applications or a checklist of technologies. It is that, of course, but it is also a change in the way we work — a change that is occurring slowly and with difficulty.

Because the nature of the industry is evolving and our readers' needs are changing, Computerworld OA will also be undergoing some transformations. This is the last issue of Computerworld

QA. We believe we have an even better thing in store for you for '85. Through extensive reader and market research, we have determined how to help you stay on top of what's happening. On Jan. 16, Computerworld readers will receive the premier issue of Computerworld Focus, a whole new concept in editorial coverage for us. In 10 issues next year, we will present concise, tightly integrated packages of articles covering the trends, state-of-the-art products, analysis, issues and news by top experts in the field as well as by our own staff. Rather than cover end-user computing in general, we will deliver to our MIS readers in-depth coverage on the industry's hottest topics. We will provide you with all you ever needed to know about micros, OA, Unix, software, business graphics, networks and even factory automation. We'll concentrate on one topic in each issue, so we'll be able to tell you what's happening where, when and for whom.

You as an MIS manager are already or soon will be deeply involved in planning, selecting and implementing technologies and products in these areas. If not, you should be. We're excited about the changes in store; we feel they will provide that very special perspective and critical information resource you'll be needing. We won't report on everything that happens — only on what's important. And we'll tell it in a way that you, your staff and (even) your boss will be able to benefit from.

We thank you for your enthusiasm and loyalty to Computerworld QA and promise you an even better package next year — Computerworld Focus. From myself and the staff, Merry Christmas and Happy New Year.

LETTERS

GIBBERISH OVERLOAD

Your editorial in the Aug. 15, 1984, issue of Computerworld OA asked what it was that was keeping users from attending computer shows.

In my opinion, there is one reason for the lack of interest shown at, and therefore in, computer shows of late: INFORMATION

OVERLOAD. I recently attended the Federal Computer Conference. I had received a "free" invitation to this exposition — only to see the same "free" pass published in the Washington Post a few days before the show opened.)

Within one hour, I could not tell you the difference between a modem and a VDT, between local-area networks and long-distance

telecommunications, between professional computers and office automation equipment. My feet hurt. I got no in-depth answers from the salespeople (who were not trained to answer in-depth questions), and I heaved home a lot of product literature that did not address my needs.

As I left the convention center, I felt like part of the madding crowd

— ready for the padded cell.

Having noted that certain major computer and office automation firms were not present, I determined why IBM sells so well: "IBM" takes up much less room in my brain than does the roomful of gibberish I had just left.

Ellen L. Bouwkamp
Washington, D.C.

STANLEY



Computerworld Focus

Computerworld Focus will be published 10 times in 1984. Remember, it's your publication. Send comments on what you like, don't like or want to see included to The Editor, Computerworld Focus, 375 Cochituate Road, Box 580, Framingham, Mass. 01701. CW subscribers will continue to receive issues as part of their subscriptions.

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QA FORUM Q&A

By Andria Rosal

An integrated office system must extend beyond just the integration of functions to the file manager and the operating system. The success of a hardware design should also be measured by its ability to support various operating systems and to process different file structures through its file manager. The ideal product will support integration on three levels: application, file and operating system. Today, however, most developments are at the application level only.

Application Integration. Integration at the application level can best be described as integrated packages available on personal computers. One example of these packages is Lotus Development Corp.'s 1-2-3. Different functions are closely coupled to ensure interactive relationships among the various applications.

The next step, which only a few vendors have mastered, is to include data transfers from one application to another. It is not sufficient just to copy data into another application and data transfers should not be restricted to similar kinds of hardware. Rather, all types of systems should participate in data transfers and be executed within an interrupt mode. The integrity of the data file should also stay intact following the transfer.

For vendors, the most difficult task will be to develop a common user interface across all applications. Vendors that have developed programs to run under specific hardware have succeeded in these developments, but the industry is evolving into integrating third-party software programs into the turnkey office applications. Unless the vendor is willing to add a superficial layer on top of these applications, one cannot assume third-party software will use similar command structures just because it can be accessed from within that vendor's integrated software offering.

File Integration. The complexity of a file system will depend on the operating system it is built upon and, in some cases, on the underlying data base management system. The file system also directly affects the flexibility users have within applications. If it can support compound documents or if different application files can be stored in a single file element (folder or drawer), then the process of simultaneously transferring and manipulating multiple application files is simplified.

For the vendor designing it, this type of file system is the result of very complex program routines. Even so, a few vendors are on the right track. Generally, these vendors support one file manager for every system in their product line.

Those that have not insisted on a consistent file system are realizing that utilities and/or conversion programs must be written for

each file structure that will be part of their integrated system plans. For the end user, this will in most cases translate into more operator keystrokes. The end user will also sacrifice flexibility by not being able to access one common file directory or by not having access to a directory that may not be in his file manager. This defeats the power of an integrated system; at the crux of file services should be a facility to instantly access or retrieve data from the file directory. A directory should be able to be accessed from within any type of application or any screen form. The file system should support a facility that would allow interrupting one application to enter into another, then returning to the original location in the working file. Without a consistent file manager, these operations are cumbersome — in most cases, not even implemented.

Operating System Integration. Until networking different systems together became the "in thing," operating systems were hardly discussed as issues in office systems analyses. Now, with the need to have consistent, portable and even nonrestrictive operating systems, the operating system's influence on the user interface is being acknowledged. Because all applications are designed to run on top of it, the operating system becomes the foundation of the command sequences needed to run these applications.

Most vendors protect the user from having to cope with the "programmer's language" by putting a mask over the operating system. This mask can take the form of menus, fill-in-the-blank screens and even user-friendly commands. Many WP and DP vendors have succeeded in implementing this disguise, but personal computer vendors have not.

When a vendor decides to design an integrated office system by linking together its existing products, the underlying operating systems play a major role in the user interface. If one consistent operating system is employed, the user is hardly aware of the operating system processes.

If, however, an integrated office system consists of multiple operating systems, either the vendor must develop translations and utilities for each operating system on the network or the user becomes explicitly involved in instructing the system about how he wants to interact with the other operating systems. Another counterproductive issue surfaces when one operating system is upgraded with a new software revision. How will the other operating system applications interact with the revisions? What must be done to allow this interaction?

One of the most important operating system concerns is how multiple operating systems will coexist in a networked architecture.

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Ericsson, Inc., a subsidiary of the Sweden-based telecommunications and information systems manufacturer L.M. Ericsson, recently cosponsored a conference on ergonomics in seven cities in the U.S. and Europe. The company, which is highly involved in European ergonomics, is entering the U.S. intending to take a 5% to 7% share of the U.S. PBX market over the next three years. Hakan Ledin, Ericsson, Inc.'s president and chairman, talked with Computerworld QA about his company's entry into the market here and about the contributions ergonomics can make in the U.S. office.

What advantages can Ericsson offer in the U.S. market?

Ergonomics — it has differentiated us in Europe and contributed very much to our success there, and I think the same can be true here. I know, most people in this country tell me nobody knows what ergonomics is and people are not prepared to pay for it.

My answer is, first, it is true — people here don't know what ergonomics is; nevertheless, they deal with ergonomic issues every day. Second, people do not have to pay for ergonomics. If you ask the right questions when a product is being designed, you design it correctly from the beginning. In most cases, the buyer won't have to pay anything for good ergonomics — it is an extra benefit.

What can ergonomics contribute in the U.S. office?

A good definition of ergonomics is that it is quality, productivity and human satisfaction. If I add that together and ask a businessman what it represents, he will answer that it represents profitability. OK, another name for that combination is ergonomics!

More and more of the organization's cost is now related to the information family, and management is becoming more aware of this. Traditionally, you could look at the DP department and see if it was productive. Now, a rapidly increasing portion of the total cost for information handling is at the end user's desk — not just the cost of the equipment on that desk, but also the cost of the time people spend at the workstation.

Are you in favor of legislating ergonomics?

Legislating ergonomics doesn't serve anybody's purpose. Legislation is always perceived as something that costs money. The businessman says, "Here comes more legislation; that means I have to pay for it." You can explain to people what these concerns are and that many of the solutions are available for free.

Do you believe education is an effective way to reach these goals in the U.S.?

Well, we are trying to educate people through this conference. We sent out a special invitation to chief executive officers of about 1,200 companies — not inviting the CEO personally, but telling him that the conference was coming up and, if the CEO was interested, asking him who in his organization we should address on these matters.

More than 80% of the CEOs responded. That's not only very interesting, it also shows something important: On the bottom of the organization, there is an absolute awareness of the need for ergonomics — the people sitting there working all day are aware of it. But now top management is also becoming aware; they are finding out that information technology means more than just a computer center. To many companies, the application of the information technology is becoming a strategic issue, not a cost-cutting issue.

The link that is missing is the middle manager, the link between the top and the bottom.

Do you think the middle manager is seeing the problem, but for some reason is not communicating it?

That's right. They don't know if they dare to mention these concerns. They don't know if top management will oppose their suggestions because perhaps finding solutions will cost a lot of money. If people can come to understand that ergonomics is nothing but common sense, it would really be to everybody's benefit.

What segment of the U.S. market is Ericsson targeting?

We are basing our entry into the market on our communications systems, and we are looking at two major market areas. In the first, the PBX market, we are offering our MD 110 voice and data PBX product. We believe the PBX will tie the office together as the means of horizontal communication. Local-area networks can offer high speed and high capacity, but how many in the office really need that speed?

The other area is the central office, where we want to take advantage of AT&T's divestiture. We are developing our AXE [digital central office switching] system so we can offer it to the Bell Operating Co. We are also exploring our opportunities in the workstation market.

IBM recently announced it would acquire Rolm Corp. Will this affect your plans?

This move did not come as a major surprise to us. IBM already existed as a presence in the market because of the minority interest it owned in Rolm, of course. If anything, IBM's move lets us know we are moving in the right direction by pursuing the PBX market.

QA NEWS

DEMISE OF DISPLAYWRITER?

Though IBM says otherwise, industry analysts and IBM customers are convinced the Displaywriter is dead. The dirges began when interest in the IBM Personal Computer as an office workstation soared, and analysts now feel Displaywriter's demise is simply a matter of time — the time it takes IBM to introduce a new keyboard for the PC.

In its relatively short lifespan, the Displaywriter has fallen from grace rather quickly. The product was introduced amid the stand-alone stampede in 1980-81 and was an immediate hit. Tom Willmott, director of user programs for the International Data Corp., estimated that as many as 200,000 Displaywriters were shipped in its first 18 months on the market. Unfortunately for Displaywriter, the IBM PC, introduced in 1981, was enjoying even greater popularity. As the PC began to dominate the Fortune 500 market, IBM began to focus attention on that product to the detriment of Displaywriter.

IBM customers and industry consultants tend to sense a change in focus earlier this year when Big Blue started quoting 11-month delays on shipments of Displaywriters. According to one

customer, orders used to be filled within three weeks. Though he had installed more than 200 of the workstations in 1982 and 83, this customer added just 11 this year. "The Displaywriter is dead here," he said.

"The impression I have is that the PC running Displaywriter software is the replacement for Displaywriter," said Patty Seybold of the Seybold Consulting Group in Boston. "It won't be too long before software for the PC is equivalent to the functionality of Displaywriter, and then the only remaining missing piece will be a new keyboard."

According to Willmott, the Displaywriter costs too much money and is not compatible with IBM's workstation strategy. "There's no reason to have two boxes doing the same thing... one costing \$14,000 and the other \$5,000. People will no longer buy that. Even the sucker-born-every-minute routine will run dry in 1985," he said.

IBM is still "talking up" Displaywriter until the new keyboard is ready, Willmott added. "They have been quoted as saying they want an 'orderly transition' to the new keyboard," he explained. "I believe they are waiting for inventories on the Displaywriter to get lower and they want to avoid another 'Chrysler' fiasco like they had with PC-Jr. They want the dust to settle on keyboard design

in the industry."

Of course, only IBM knows for sure what its plans are for its products. A company spokesperson pointed out that IBM is committed to both the Displaywriter and the PC functioning in the marketplace. "Customers will continue to want high-function, stand-alone word processing," the spokesperson said. "They will also want to move away from dedicated word processors to more intelligent workstations, so we see a growing commitment to end users from within MIS. Off budget expenses are growing in the continued turning over of responsibility and expenses to end users, he said.

Stay tuned.

QA GROWS IN MIS

Office automation expenditures within the management information systems (MIS) budget increased nearly 50% over the past year, reflecting both the steady growth of QA and increasing consolidation with MIS. This was among the key findings of the Diebold Group's 1984 Biannual MIS Budget Survey.

According to David Dell, director of research services for Diebold, QA still remains a very small percentage — between 1.5% and 2% — of the MIS budget in major corporations. Despite those numbers, Dell is convinced that they point to a trend.

"We're not talking about huge

dollar increases, but there is a significant share of new money that goes into the MIS budget being diverted specifically to office automation," Dell explained. The figures also reflect a better accounting and control of expenditures as well as increased MIS responsibility in the QA area, he added.

The survey also found that 80% of respondents have information centers, up from 67% in 1983. This reflects what Dell called a growing commitment to end users from within MIS. Off budget expenses are growing in the continued turning over of responsibility and expenses to end users, he said.

According to the survey — which included 150 companies with MIS budgets of approximately \$30 million to \$40 million — MIS budgets have increased only modestly in comparison with the sharp increases in work load most companies are demanding from their information resources. This has forced MIS management in these companies to reallocate resources and shift more work and responsibility to the users of computer services and equipment within the corporation.

"The real problems of growth and managing and having something to manage are just beginning," Dell stated. "It's like saying the most exciting part of a

(Continued on Page 44)

BRIEFS

NEW YORK — Europe may be losing the word processing wars from U.S. high-tech companies, according to John Diebold of The Diebold Group, Inc.

In a speech he gave recently in Frankfurt, Diebold warned that Europeans expect too much from venture capital, especially in a European environment where risk-taking is discouraged and failure is not tolerated. He also warned that too much emphasis is being put on European high technology and said that only 1.5% of new U.S. businesses each year are high tech. For more information, contact The Diebold Group, Inc., 475 Park Ave. South, New York, N.Y. 10016.

WELLESLEY, Mass. — The demand for integrated software on personal computers will skyrocket from 445,000 packages in 1983 to more than 3.6 million in 1988, according to a report by Venture Development Corp. (VDC).

"Integrated Software for Personal Computers 1983-1988," said that about half of the packages are currently sold at computer stores and that standard distribution channels will be severely reduced in the future.

The report is available for \$2,850 from VDC, One Washington St., Wellesley, Mass. 02181.

DELRAN, N.J. — NRI, Inc.'s word processing systems swept the top three positions of Datapro Research Corp.'s 1984 Honor Roll of Word Processing Systems.

The other vendors selected after a survey of 3,400 WP users were CPT Corp., Compucorp and Exxon Corp. NRI was the only vendor selected in both stand-alone and multimarket categories.

The 25-page report, "User Ratings of Word Processing Systems," costs \$29 from Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

PORTOLA VALLEY, Calif. — U.S. expenditures on expert systems will grow to \$2.3 billion by 1990, according to a report from International Planning Information (IPI). The 380-page report, "The Commercial Application of Expert System Technology," said that while Digital Equipment Corp. computers are currently the most widely used, the market for workstations and software "shells" for expert system development is expanding. The report costs \$395 from IPI, 164 Pecora Way, Portola Valley, Calif. 94025.

WELLESLEY, Mass. — There are more than 3,000 software packages for the IBM Personal Computer and IBM compatibles, according to a report by Venture

Development Corp. (VDC) that describes each of them.

The study, "IBM PC Software: Directory and Analysis," said that 26% of the titles fall in the general business category and 18% are designed for specific vertical markets. The \$795 report is available from VDC, One Washington St., Wellesley, Mass. 02181.

PORTOLA VALLEY, Calif. — The number of personal computers shipped to Europe and users will skyrocket 57% in 1984, according to a report by International Planning Information (IPI).

The 275-page report pointed out that the installed base of micros in Europe is expected to reach 11 million by 1990. IBM's share in this market reached 27% in 1984. The report, "The European Personal Computer Market 1984-1990," is available for \$970 from IPI, 164 Pecora Way, Portola Valley, Calif. 94025.

YORKTOWN HEIGHTS, N.Y. — IBM research scientists have produced an experimental system that can correctly recognize 5,000 spoken words from a standard business vocabulary, the company reported.

The system, which requires a user to train it by reading a brief standard text, is reportedly correct 95% of the time. For more information, contact IBM Research

Division, P.O. Box 216, Yorktown Heights, N.Y. 10598.

FRAMINGHAM, Mass. — More than 85% of salespeople and mainframe users choose DP manufacturers for their service contracts, according to a report from International Data Corp. (IDC).

Newell-Packard Co. and Digital Equipment Corp. lead the rest of the vendors, according to users surveyed by IDC. The report, "User Satisfaction with Customer Service: Minis and Mainframes," said third-party maintenance firms account for only 5% of the service market. It is available for \$2,400 from IDC, 5 Speen St., Framingham, Mass. 01701.

NORWALK, Conn. — One of the greatest fears of DP and corporate security department heads is deliberate harmful acts by disgruntled employees, according to a report by International Resource Development, Inc. (IRD).

Employee revenge, made easy by an accessible microcomputer, was ranked the second greatest fear, following accidental mishaps by workers. The 220-page report, "Computer Security — Hardware, Software, Systems and Facilities Markets," costs \$1,850 from IRD, 6 Provost St., Norwalk, Conn. 06855.

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DAVID A. WICK

or three. It was, they pointed out, a time for users to step back and assess implementation strategies and future needs while taking realistic looks at such issues as networking and communications.

Several industry consultants and analysts discussed with Computerworld OA some of the major events of 1984 and looked ahead to 1985. Here is what grabbed their attention:

IBM in the Office: The year started slowly for IBM, but by midsummer Big Blue picked up the pace. As one analyst said, "Everything from July on has been one IBM move after another. The pressure just isn't slowing down."

In the spring, IBM shocked the computer industry by announcing a delay of two to three years on its token ring local-area network offering. Though the delay was startling, the statement of direction "made the local-area network market legitimate," according to Melody Johnson, an analyst with Cable, Howse and Ragan in Seattle.

At the same time, IBM offered a cabling configuration and, later, a network from Sytek, Inc. specifically for its personal computers, as an interim network solution. As Ed White, associate director of OA services at Dataquest, Inc. pointed out, user excitement about networks has generally been premature, and "IBM has honestly faced the problem that the user is not ready for networking yet because networking is going to involve integrated voice, text and data."

Despite that, IBM's network announcements and nonannouncements actually stimulated business in that market, according to other analysts.

The IBM PC grew even stronger during 1984 as the de facto standard in the office and IBM increased the pressure on competitors and look-alike vendors by lowering its prices and announcing a glut of software.

The struggling PC Jr. was given a shot in the arm with a new keyboard and additional features, and the long-awaited Popcorn appeared in August in the form of the PC AT. The AT, a powerful, aggressively priced multiuser system, is expected to have a major impact on the desktop market, a market IBM already controls.

Some analysts, however, don't believe the AT is a breakthrough product for office automation. "I was more fascinated that they could put 1.2M bytes on a floppy disk," Tom Willmott, director of user services for the International Data Corp. said, referring to part of the AT's offering. "The fact that they were going to incorporate an Intel 286 into a new

high-end product was no surprise, and I haven't seen anything new or innovative in the architecture."

"I question whether or not the AT could be considered an OA device," White added.

However it eventually fits into IBM's office plans, the AT was simply another example of IBM aggressively flexing its muscle.

In late September, the company announced its plans to acquire Rolm Corp., a leading PBX manufacturer which it had purchased a percentage of last year.

IBM reportedly wasn't happy with the pace of development on the integrated voice products Rolm had undertaken. According to Randy Goldfield, president of the Omni-

Group in New York, the Rolm announcement was the last piece IBM needed in order to compete with AT&T in the PBX arena.

Whatever the true reason for the takeover, consultants agreed it underscored the importance of having a powerful voice-switching PBX network capability in order to compete for the office market.



was an interesting surprise in 1984. The jury is still out on its final acceptance."

Seibold pointed out that the Mac sold well in its first year because it was a novelty and that in its original configuration, it simply was not an office machine. In fact, the stepped-up introduction of the 512K-byte "Fat Mac" was Apple's reaction to that, she said.

"They knew from corporate customers that they had to have a more powerful machine quickly if it was to be taken as anything more than a toy." In November, Apple undertook a multimillion-dollar advertising campaign to bolster sales in the office market.

In 1985, Seibold expects Apple to concentrate on connecting and networking Macs through such products as Apple Bus. She is concerned that Apple is underestimating the amount of work it needs to do in order to connect Macs to other systems. "At this point, all they are saying is that if you want your Mac to talk to a Wang system, buy the source code from us and modify it. No user wants to do that. Apple is going to have to learn a few lessons, but they probably have time," she added.

Wang Laboratories. Wang's Office Assistant: Though it wasn't met with a great deal of fanfare, Wang's Office Assistant is considered a key office product for 1984. At \$2,395, the multitasking desktop unit is aimed specifically at the secretarial marketplace, an audience that has been swept aside in the rush to automate the professional desktop.

Positioned between an electronic typewriter and a personal computer, the Office Assistant "addresses the real issues of the secretary," according to Dataquest's White. "It's not a perfect product, but it has combined the necessities of word processing and the electronic typewriter in a single device that also allows for the expansion potential of communications, networking and limited PC applications," he stated.

Not everyone is convinced that Wang was simply identifying an overlooked market. Johnson pointed out that, like other office vendors, Wang is losing money on its personal computers. At Wang, the problems at the low end were starting to hurt earnings; as a result, the company decided against bringing out just another low-cost PC, she said. Instead, they chose to try to differentiate the market.

Analysts agree 1985 will be a critical year for Wang. Its proprietary office systems software, Wang Office, is now shipping, and customers can decide whether it is prudent to stick with the vendor or to look elsewhere. Elsewhere may just be IBM, which applied a tightening hand to the neck of Wang with its System 36 announcements in October. By offering software that runs across several different office product lines, IBM effectively negates what had long been a Wang advantage.

AT&T jumps in: In 1984,

Americans added the word divestiture to their vocabularies and AT&T took its first tentative steps into the office market. As Seibold indicated, the significance of AT&T's first year in the market "was how badly it did." The company may have done well enough financially and solidified its PBX market, but it did nothing in office systems, she said.

In fact, AT&T did announce its 386 line of minis and superminis in March and later unveiled an MS-DOS-based personal computer (designed by Ing. C. Olivetti & Co., in Italy). In addition, it stepped

"No one knows how to network the workstation, no one knows why they should do it and no one knows how to cost-justify it. If you wind up having a workstation on everyone's desk, but have no network, aren't you missing out on the whole point?"

Randy Goldfield, Omni Group

up its support of Unix as a de facto standard operating system. All that, however, was not enough.

"They don't have any software," Seibold explained. "They devoted so much time to reorganizing, which was one of the problems and, frankly, they underestimated how much time it takes to create office application software."

In fairness, consultants agreed that AT&T simply needs more time. "They've got a chance to shine when we really get into integrated voice, text and data," said White. "You'll see progress in '85 but more likely in the '86 to '87 timeframe."

Market Trends: With IBM surging, consultants have become cautious about predicting survivors in the office market. In the personal computer battle, IBM has helped kick off the anticipated shakeout, and 1984 was a year of diminished returns for many start-ups. Gavilan Computer Corp., Victor Technologies, Inc., Oticon Advanced Systems, Inc., Eagle Computer Inc. and others either filed for bankruptcy or were on the brink.

In the office market, despite IBM's movements or perhaps because of them, some analysts are predicting a backlash against Big Blue. According to Goldfield, the maturing of the marketplace is making a difference. "In an immature marketplace, people choose IBM because no one ever got fired for picking IBM," she explained. "As the market matures, there are more viable alternatives that emerge."

"Every time IBM makes an announcement it attracts users while at the same time, it tells many that it's not the way to go," Seibold added.

Consultants agreed that Wang would continue to be IBM's stron-

gest competitor in the office, but that both Digital Equipment Corp., bolstered by an internal reorganization, and Data General Corp., with its well-regarded DG/One portable, are becoming major factors as well. According to Johnson, some companies — Xerox Corp., Honeywell, Inc. and Exxon Office Systems, Inc., for example — will have to find niches and vertical markets to survive while others, such as CPT Corp., NRI, Inc. and Syntex, face uncertain futures.

A surprise for '85 may be Data-point Corp. which, according to

Willmott, has hit bottom and is ready for a comeback with some innovative new products. "I look for Datapoint to make a bold turnaround in 1985," he said.

Other Major Issues: Perhaps the most important issue to emerge in the office this year was the question of networking. Despite White's feeling that users aren't ready for it, networking personal computers and office systems was high on the list of priorities for OA implementers, according to consultants. Goldfield's Omni Group conducted an extensive study involving more than 800 Fortune 500 decision makers and, according to the study, networking the workstation is the single greatest concern.

"No one knows how to do it, no one knows why they should do it and no one knows how to cost-justify it. If you wind up having a workstation on everyone's desk but no network, aren't you missing out on the whole point?" asked Goldfield.

In that regard, the groundwork has been laid for further controversy in 1985 over IBM's DIA-DCA and the issues of exchanging and formatting the text, graphics and voice capabilities over multiple vendor equipment, according to Willmott. "These are very important issues for office planners when a large corporation wishes to have distribution networks that make sense across the total company," he said. "It's at the point where the giants like DEC, Wang and DG have to complete their strategic planning for these issues, but we've yet to see the products or results of the research and development. That's likely to occur in 1985."

Though analysts agreed there were few major software announcements (beyond IBM's System 36) in 1984, Dean Hiller of

D.L. Hiller & Assoc. in Sterling Heights, Mich., felt that the truly integrated software packages, in the form of Ashton-Tate's Framework and Lotus Development Corp.'s Symphony, were shipped. Hiller also pointed out that the acceptance of these kinds of packages by "power users" in corporations was a major trend during the year.

"You tend to spend a dollar on training for every \$3 you spend on the system," said Hiller. "Therefore, it makes sense to train somebody on a product that has a consistent command interface. Integrated software and products with the same command syntax are products you should train the masses on."

Seibold predicted that 1985 would be the year of networking and multitasker software as well as applications generation software. "That's going to be the next wave after spreadsheets," she said. Seibold also predicted a solidification of offerings in the telephony arena, including the integration of telephony functions into office systems.

In the Emperor's New Clothes department, Unix was among the hottest topics of 1984. But the Bell Labs innovative operating system was more steeze than steak, particularly in the office market, according to consultants. "Unix is not going to change the way people use computers and do data processing in commercial installations," Willmott said. "Unix is going to continue to be an issue next year and then it will become a nonissue the year after." Seibold added.

Seibold pointed out that despite the fact that people assume Unix is a requirement for minicomputers and for networking personal computers, the vote is still not in. "Either MS-DOS will migrate close enough to Unix, or Unix will be improved so that it's better for networking or there will be a third kind of hybrid operating system that will wrap up as a replacement. I don't see Unix as it currently exists surviving as a major factor over the next two or three years," she stated.

The State of OA: In 1984, there was a sense that the term office automation had outlived its usefulness. There was also the very real feeling that despite years of discussion, very little had actually changed in the way people work in the office.

According to Ed White, the complex picture of integrated office systems continues to baffle management and, in order for true office automation to be implemented, the office faces an almost total reorganization in terms of work flow and the way people think about their jobs. "There needs to be a lot of training and a lot of systems design, and it will be a good 10 years before it all happens," White said. OA

Rykfin is senior writer at Computerworld OA.



EUGENE MANNO, HONEYWELL'S ASSOCIATE GROUP VICE-PRESIDENT FOR SMALL COMPUTER AND OFFICE SYSTEMS, AT THE MICROSYSTEM NX.

HIGH HOPES AT HONEYWELL

BY GLENN RIFKIN

In 1985, Honeywell, Inc. will celebrate its 100th birthday. The \$6 billion Minneapolis-based giant hopes to get its 94,000 employees in the party mood by creating an up-scale national celebration of its centennial. In the office automation community the noisy party will probably be met with great surprise — instead of a birthday, the industry was more likely expecting a wake.

Though Honeywell's other businesses (aerospace and defense, control products and systems, communications and so on) may all have reason to celebrate, the company's computer business — Honeywell Informations Systems — has run into hard times and a Big Blue wall. Most hard hit has been the office systems division, which virtually disappeared from sight for nearly two years. The di-

vision is now making a comeback attempt with a reorganization, reported autonomy, a new leader, a spate of new products and a new strategy for penetrating the OA market.

Industry analysts are divided on Honeywell's chances for success. Some, like Tom Billadeau, vice-president of the Gartner Group in Stamford, Conn., have written off Honeywell completely. "They have done basically nothing that makes any sense at all in the office automation business to date," Billadeau stated. Others are taking a wait-and-see stance, believing that the company has at the very least set its sights on more realistic goals and has the presence via its large systems to make a go of it.

What Honeywell intends to do, in fact, is forego the broad-based general OA market and concen-

trate on large but specific vertical markets with tools designed especially for those markets. It also wants to look to its installed base of large computers and serve as a systems integrator for that base in the office. According to Chuck Ross, director of market segment operations, "That is our history. We got into the business as a systems integrator. The others are iron pumpers; they got into the business that way."

For Honeywell, the task at hand will be difficult and multifaceted. The company is still fending off questions about its inability to move swiftly and innovatively in the rapid-paced end-user market. Some analysts, in fact, have pointed out that several of the new products are merely revamped versions of previous failures. In a business driven by marketing and

hype. Honeywell has earned a reputation as boring and slow. It is also not out from under the shadow of the massive layoffs and outbacks that racked Honeywell Information Systems two years ago. Questions about internal morale and corporate commitment to QA still abound.

Although the industry may still be unsure, internally things have been straightened out, according to James J. Renier, vice-chairman of Honeywell and president of Honeywell Information Systems. "It is correct to say that in the past in the office automation area, we did not do a good, quality job. That's prior to 1982. Our products didn't have the requisite quality. They have it now and that period is behind us."

"Sometimes an organization has problems and people get discouraged," Renier said. "A conclusion is drawn that we are not interested any more, and that's a natural kind of assumption. But we have never lost our enthusiasm for the market and we have never backed off in our support of the effort."

During the next year, Honeywell intends to get its message out to the buying public via a stepped-up national advertising and public relations campaign de-

signed to highlight its new strategy and products. Though it has taken Information Systems nearly two years to reorganize and straighten out its internal affairs, company officials are confident the window of opportunity has not closed. "These are huge markets," Renier insisted. "There is still room for many companies to do their thing."

Among the changes was the recent naming of Eugene Manno to the new position of associate group vice-president for small computer and office systems. Manno had served as vice-president and general manager of Office Management Systems and now assumes control of the entire QA push for Honeywell.

According to Manno, the change is a significant one. With its 25,000 employees and wide-ranging line of computers, Information Systems had been a monolithic structure without an identity, he said. It was simply one huge division reporting to Minneapolis. Now, all marketing and pricing, profit and loss and strategic decisions concerning QA rest with Manno in the division's Burlington, Mass., office.

Manno, admitting impatience on his part, explained that the process took so long because "changing an organization and its thought processes and culture that have been deeply engrained

over a 25-year period can only be accomplished at the assimilation rate of the people."

While coordinating the structural changes, Manno's group also faced the difficult task of new product development and creating a viable new marketing strategy. The company decided to forego the general QA market — hence the vertical market approach. Though Honeywell, through its mainframe computers, has a wide DP presence, there is serious question as to how much of its installed base is left to target for office systems.

"We project that 50% of its installed base are Wang customers," Billadeau said. "Another 25% have made a different vendor choice. That leaves them just 25% without a commitment."

David Cushing, an analyst with the Omni Group in New York, pointed out that, despite the presence of other vendors in its base, Honeywell still has "a lot of elbow room in terms of pure market volume." "We want a bigger share of smaller markets," Manno stated.

Those vertical markets include administrative sales support — specifically, remote sales locations for large and mid-size corporations; engineering, administrative support; and the intelligent building and shared tenant environment (a market that is carefully tied into Honeywell's expertise in the controls arena). The company is also taking a hard look at the health and medical records market.

"It's a good marketing strategy that others will take as well," said Ronni Marshak, associate editor of Seybold Publications. "They are not specializing too much — sales and engineering are large enough markets to be generic. Frankly, it is the only way they can keep going."

To attack those markets, Honeywell has introduced several new products and indicated that more are on the way. For the sales support market, the company unveiled its Office Management System (OMS) 40 and 90. To address the engineering and administrative support market, Honeywell introduced its Microsystem NX, a Unix-based multifunction workstation developed by Corvus Systems, Inc.

The OMS 40, available in two models, is based on Honeywell's 16-bit DPS 8/40 minicomputer and runs the proprietary Gcos 6 operating system while supporting up to eight users on Model 2. The OMS 90, based on the 32-bit DPS 6/95 supermini, is available in three models and is packaged for larger offices. It can reportedly support up to 24 workstations on Model 3. Though repackaged and marketed as new offerings, the OMS systems are merely revamped versions of the ill-fated Office Automation System (OAS) software running on the DPS 6, according to the Seybold Report, an industry newsletter.

With an average per workstation cost of \$6,495, Honeywell believes it is aggressively attacking

the price/performance levels of competitors such as Wang Laboratories, Inc., IBM and Digital Equipment Corp. Though the OMS systems don't currently offer connectivity to IBM PCs, Honeywell indicated that capability would be offered on the next release of the product in late 1985.

At under \$10,000, the Microsystem NX is aimed specifically at the engineering support environment. Based on the Motorola, Inc. 68000 processor, the NX comes with 512K bytes of main memory, a detachable keyboard, 12M or 16M bytes of disk storage and a 15-in. monochrome, high-resolution monitor.

According to Martin Strakhovskiy, director of workstation marketing, Honeywell has already begun putting NXs on the desks of its own 30,000 engineers. The NX was not designed to compete with advanced computer-aided design and manufacturing systems; instead, it is geared to provide administrative support for engineers when the design work is done.

Though Honeywell has entered its office thrust around the DPS 6 minicomputer, it hasn't ignored the low end completely. In 1983, it brought out the IBM PC-compatible Microsystem 6/10 and will soon unveil the Microsystem PC. However, the company seems to be making only a perfunctory gesture toward the low end; both micros are merely OEMed versions of Columbia Data Systems, Inc. products.

"They are pass-through products," Ross admitted. "If sales people can sell [the 6/10 and PC] to anyone, but we're playing the role of systems integrator and they are aimed at our customer base as added value for a DPS 6 system."

Honeywell has also announced compatibility with several local-area network technologies such as Ethernet, Omninet (from Corvus), Bridge Communications and Hyperchannel. Manno's group is seeking newly won clients in the communications division, but it has also established agreements with such vendors as AT&T, Ericsson Information Systems, Inc. and Northern Telecom, Inc. for PBX technology.

Although offerings such as Omninet solve the short-term networking needs, Manno acknowledged that higher level protocols are necessary. He pointed out that Honeywell offers both its own DSA — an architecture based on the international Standards Organization OSI model — and IBM SNA compatibility. Honeywell, he said, plans to remain committed to IBM de facto standards such as DSA-DICA and plans to use its new OMS line as the gateway to these higher level protocols.

Within the next six months, Honeywell also plans to announce its entry into the image-processing arena. The company is working with the Belgian company

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Correlative Systems, Inc., which has developed an image-handling system based on the DPS 6. Manno said he is confident that image processing will be a large business for Honeywell. "The big key now is storage; no one has it solved as yet," he added.

The newly announced systems, coupled with Honeywell's wide range of minis and mainframes, gives the company extensive coverage across many potential markets. But analysts are reserving judgment about the new offerings and any guarantee of success in the office. Seybold's Marshak noted, "the new products are standard

Honeywell fare — not exciting, but they can do the job. Targeting niche markets is probably a good idea, and when you look at who is stumbling — Xerox, Exxon — Honeywell is a little above them, probably because Honeywell's is a little more conservative. I don't see it disappearing very quickly."

"The idea of working with the user to develop a tailored system for a specific need is a good idea, and some will take advantage of it," said Ken Sobel-Feldman of the Gartner Group. "But I don't think they can succeed overall with it. Users generally want vendors to supply the solution and do all the work. Honeywell needs user commitment, and that could be a long time coming."

How much time Honeywell will need is as unclear as how much time it will get. Renier insisted that the company is in the market for the long haul. Because of Honeywell's size, it does not release revenue figures for each division, but the company indicated that Manno's group had sales of more than \$450 million in 1983. The unit made money in 1984, but "I will say the numbers have got to be better," Manno said. The new vertical markets have yet to earn a profit, but the strategy is too recent to be effectively judged, a spokesman said.

There is also speculation that fallout from Honeywell's internal troubles continues to take its toll. One former employee pointed out

that fiscal security has come simply because Honeywell has made its numbers more reachable. The company has cut back so dramatically in terms of overhead and personnel (more than 3,000 Information Systems employees were laid off two years ago) that it is able to appear lean and profitable. Unfortunately, this cutting back has also meant that Honeywell is losing market share in the computer business. With only 2% of that business to its credit, there is not much room for decline.

With IBM, AT&T, DEC and a host of others clamoring for pieces of its niche markets and its installed base, Honeywell has to offer something different and better.

"We're a systems integrator," Ross said. "We said that two years ago, and it wasn't what people

The company has cut back so dramatically that it is able to appear lean and profitable. Unfortunately, this cutting back has also meant that Honeywell is losing market share in the computer business.

wanted. I have no fear that we're too late in the market; if anything, we were too early," he added. "Our fundamental strategy is not to simply have an account, but to integrate Wang, IBM, Hewlett-Packard, etc. and ourselves into an office information network responding to the requirements of large organizations. Before, the market didn't want that. But it's ready now and demanding it."

"In the industries we choose to be in, we will be far more flexible than our competitors," added Renier. "We'll offer hardware that will compete with the rest, but they'll get more from us in terms of a system solution and customer service."

Internally, morale is reportedly up again. "I expect relative stability," Renier stated. "I would never promise [no more layoffs], however, simply because promises of that nature are irresponsible. I just don't see anything like what happened two years ago. There's a strong spirit here now."

Though the analysts tend to be a bit more cautious than company executives, there is general agreement that Honeywell has a fighting chance.

"Don't bury Honeywell just yet," Marshak said. "We've been waiting for them to get out of the business since 1975, and they're still here."

QA

R/kin is senior writer at Computerworld QA.

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FEELING AT HOME WITH PORTABLES

BY LAWRENCE F. VOGEL

As relatively low-cost portable computers proliferate, a nearly equal number of questions arise about how these machines can best be used to help the work force do their jobs. An assessment of the suitability of portables as workstations raises many of the same issues found with desktop units. (For the purposes of this article, a workstation is any screen/keyboard unit used by a knowledge worker to support that worker's regular duties.)

Portables and desktops target the same users; it's the technology that's different. While they still can be classified in the microcomputer genus, portables have some strikingly dissimilar characteristics. There is also a

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profound difference in the way many users react to the portable as compared with their response to its desktop counterpart.

Adam Osborne is credited with introducing the first portable model in early 1981. Although Osborne's machine could be carried from place to place, it was not an easy task. It and others that followed in the 20-plus pounds category have come to be known as "transportables" or, to less muscular users, "huggables." Purchased as portables, the bulk of these machines became de facto desktop units.

A new category of micros has formed recently and contains products much more worthy of the term "portable." Included are such machines as Hewlett-Packard Co.'s Portable 110, Grid Systems Corp.'s Compass and the Data General Corp. One at the high end and Radio Shack Corp.'s TRS-80 Model 100 and Convergent Technologies, Inc.'s Workmate at the low end. These machines generally weigh less than 10 pounds and can be carried in a standard-size briefcase. Despite some current shortcomings, this class of micros will grow into the portables of the future.

The debate over what characteristics must be present in a successful office workstation has gone on for years. Some advocates have been uncompromising in their demands for the perfect workstation. Others take the position that a stand-alone personal computer, although not offering every bell and whistle possible on a full-blown OA system, might be sufficient for the needs of many users. The lesson to be learned is that the workstation should be utilitarian and acceptable, both individually and collectively, to the users it serves.

The way micros have been accepted and utilized over the past few years has a lot to do with users' attitudes, which usually fall between two extremes. Some users (especially those who had no say in the purchase of their workstations) view their workstations as cogs in the corporate wheel. They react to the machine as if it were a standard company-issued piece of equipment, much like a telephone. It has set operational procedures and those procedures produce a standard result. To these users, the purpose of their machine is to enter data, process it and produce an output.

Other users have a different view of the machine's role. They more often consider it a personal productivity appliance. They use this machine as a tool that provides them with information to support a decision. The process of the input and output of information takes a back seat to the decision support aspect.

Users of portables generally fall into the latter category. The purchasing decision frequently lies with the individual; many portables (especially the new crop) are purchased as personal property.

The portability aspect creates a bond between person and machine which is not so frequently found with desktop users.

One executive I recently met is representative of a growing number of new users. "My company bought a number of XYZ PCs last year for all our middle managers," she said. "I learned the basics and it helped me with a few jobs. But, this new portable has done twice the work for less than half the price. I still use the XYZ for big jobs, but the portable is capable of performing at least 85% of my applications. Also, I'm not afraid to

theless important. Accurately predicting at least the next few years can save a lot of money and trouble.

• **Cost.** Just like cars, workstations come in luxury and economy models. A clear understanding of how much the user is willing to pay must be present at the outset.

An evaluation of their workstation potential will show that compromises made to reduce the size and weight of portables sometimes translate into user limitations. The most obvious shortcoming is screen size and type.

The typical portable screen is

Some machines offer read-only memory chips that contain popular software packages. This concept makes portables much more attractive as workstations because it increases the software options without substantially increasing physical size or weight.

depend on the PC, because it can go where I go. It's a new easy to take my work home, rather than working late in a deserted office to meet a deadline."

Regardless of attitude, some basic considerations should be part of a decision on which workstation is best for a given user or situation. In considering which hardware/software combination will become the workstation of choice, the user and/or company must answer several basic questions:

• **What applications are really needed?** The applications should be, of course, the primary consideration in choosing any workstation product. But the applications must be prioritized. Chances are, there will be some tradeoffs requiring a clear delineation between what's essential and what would be nice to have.

• **What level of compatibility is required?** If files are to be used by other staff members, care must be taken to ensure that they can be accessed on the other machines. Many users, even those who consider these potential incompatibilities, prefer to live with incompatible machines rather than accept second best. A decision must be made about whether the portable will be the user's only workstation or whether it will need to refer to a desktop in the office.

• **What level of communication with outside data bases is required?** Data communications capabilities on portables are every bit as complex as desktop micros. It is realistic to expect that a large number of users will have no need that exceeds the terminal emulator capability offered standard on many of the new crop of portables.

• **How important is upgradeability?** This is somewhat of a crystal ball question, but is never-

an integral liquid crystal display, similar to those found on many watches. It is seldom larger than 14 lines by 80 characters — a severe limitation in applications such as spreadsheets, where viewing a large area is crucial. Although the user has the benefit of full software functionality — he can access any cell using cursor keys or GOTO commands — the interpretation of data suffers because the spreadsheet cannot be seen as a whole. Those who use spreadsheets frequently or whose spreadsheets are complex are likely to find this limitation overwhelming. And, needless to say, anything more than the most simple graphics are ineffective.

On the other hand, applications such as simple word processing and personal data bases are not significantly inhibited by the screen size. Many users report no particular problem with these applications. In fact, the quality of their written documents often improves because they are free to edit or add to them at any time.

Keyboard type and layout can also be limitations in applications that require substantial data entry — most commonly in WP. This drawback is most apparent on Convergent Technologies' Workmate, which has round buttons for alphanumeric keys. Just as the shape of those keys can slow down input and increase errors, conventional keyboards with tightly packed and badly placed keys can inhibit efficient keyboarding.

Specifications for lightweight portables are very diverse. The virtues and vices of each must be weighed individually, but a few general comments can be made. Mass storage techniques are very important in portables. Many low-end machines have only a micro-cassette tape; high-end machines like the Grid Compass have ad-

vanced nonvolatile bubble memory. The spectrum is very wide.

Some machines offer read-only memory (ROM) chips that contain popular software packages. Purchasers of the Hewlett-Packard 110, for example, can use Lotus Development Corp.'s 1-2-3 (spreadsheet), H-P Memomaker (limited function WP) and a terminal emulator, all from integral ROM chips. Grid Systems Corp. now offers on its Compass II model external ROM software that can be changed at will by the user. Many other vendors are also committed to the ROM software concept, and a number of sub enhancements and new product announcements are expected early next year.

This ROM software concept makes portables much more attractive as workstations by increasing the software options without substantially increasing the physical size or weight. As ROM software becomes more widespread on portables, their numbers can be expected to increase dramatically.

The merits and limitations of portable computer hardware can be the source of many debates. Nevertheless, the most important topic is that they are portable — their shortcomings are tradeoffs. Portables can, after all, go anywhere from the friendly skies to a hostile boardroom. They can frequently be cost-justified solely on the value of time previously wasted but now productive.

Portables and desktops are not mutually exclusive. A growing number of companies, recognizing the need for portability, have acquired a limited number of compatible machines to be shared among users on an ad hoc basis. This is not an optimal situation; users won't use the portable for permanent tasks like personal data bases. It does, however, lay the groundwork for later acquisitions and affords users valuable hands-on experience without their having to actually purchase the machine.

An evaluation of the portable as a workstation leads back to an age-old concept. The primary consideration of the carpenter who buys an electric saw is not whether it is attractive, runs quietly or comes with a two-year guarantee. It is not even the saw that he is ultimately buying — it's the ability to cut wood. In much the same way, companies and individuals don't buy computers because they're computers. They buy them because of the productivity gains they can achieve through their use. How well the portable computer and its user interact to enhance productivity is the ultimate test of its success as a workstation. **QA**

Formerly a consultant with the Office Systems Consulting Group, Inc., Vogel has recently joined the staff of Gray Straydon International, a Wellesley, Mass.-based marketing communications firm.

GRAPHICS POUR INTO THE OFFICE

BY JEFFREY COGEN

The oft-heard remark, "Show, don't tell," can apply to many forms of business communication. Why choose words when a picture can tell the story better and quicker?

In the office, the influx of personal computers has brought with it the ability to make quick and efficient pictures with an ever-growing supply of integrated and dedicated graphics software. Once considered an unnecessary frill, graphics are quickly being accepted as standard fare in business communication.

According to industry watchers, this acceptance will fuel some staggering growth rates. Most pre-

dict that the growth of business graphics hardware and software will range from 30% to 40% annually. Carl Machover, president of the White Plains, N.Y.-based Machover Associates, predicts that sales of business graphics hardware and software will reach \$6 billion in 1990, up from \$500 million in 1982. According to International Data Corp. (IDC) of Framingham, Mass., the number of microcomputers used for some sort of business graphics will grow, in the next two years alone, from 400,000 to more than 2 million.

Why the unbridled enthusiasm? Graphics have often been over-

looked, either because of the time it takes to create a graph manually or because of the cost and turnaround time involved when the job is turned over to an in-house art department or an independent service. Microcomputers have removed these obstacles. Personal computers have automated chart production, and managers are discovering that, with a few relatively inexpensive additions, the micro they bought for spreadsheets can produce graphics. Innovative products such as Apple Computer, Inc.'s Lisa and Macintosh, equipped with high-resolution, bit-mapped displays and graphics software like Lisa Draw and Mac-



point, have spurred both the industry and end users to take another look at the possibilities of graphics.

Micros, however, are not the only reason for the interest in graphics. The lower cost and higher quality of today's graphics monitors, pen plotters, laser printers and other output devices such as 35mm slide makers make high-quality graphics an affordable option. In fact, many large companies already consider graphics a must-have tool for managers.

More managers have the option of using graphics because "more office equipment is sold with graphics capabilities as a standard feature," according to Max Weinhardt, vice-president of information systems at Strategic, Inc. of Cupertino, Calif. Graphics are becoming a sought-after feature on any office system, and most vendors are obliging.

Business graphics is a catch-all phrase encompassing bar, pie, line, flow, area, scatter and text charts, along with maps and other illustrations. These images can be viewed on a computer monitor or output as overhead transparencies, 35mm slides, video or hard copy.

Managers who make frequent presentations are among those who have long recognized the value of having computer systems produce presentation-quality graphics. Recognition of computer-generated graphics as a powerful tool for decision making, however, has lagged behind. What the vendors and analysts are saying is that graphic information enables a manager to make better decisions quicker.

"Many studies have shown that it is a lot easier to understand a graph or chart than a table of numbers," said Deborah Kelly, manager of computer graphics research at IDC. "You can understand a lot more information, a lot quicker if you can see it in a graph. Even if you don't make any presentations, it can be a very helpful tool," she added.

For busy managers, graphs may be more than helpful. "Graphics are essential in making the best decision," according to Kathryn Alexandrin, president of Microconnect, a Santa Monica, Calif., graphics consulting firm.

Up until a few years ago, color graphics terminals cost about \$20,000. Few microcomputer graphics software packages were on the market and, in fact, relatively few micros were found in businesses. The mainframe computer graphics programs, in general, were far from hospitable to non-data processing managers. For decision support, where the manager wants to see something quickly and then experiment with different what-if situations, there were noncomputerized options, but none especially quick and easy. "If you have to draw it out by hand or send it to an art department, you probably won't do it,"

Kelly said. IBM started a trend when it brought graphics to the masses with its introduction in 1979 of the low-cost 3279 color graphics terminal. The 3279 has since become the de facto standard for that capability. Other vendors followed suit, and the low-end color terminal market now ranges from \$2,000 to \$4,000.

While low-priced monochrome and color terminals brought graphics to those in mainframe environments, microcomputers brought graphics to smaller businesses and to the office desktop.

The lower cost and higher quality of today's graphics monitors, pen plotters, laser printers and other output devices make high-quality graphics an affordable option. In fact, many large companies already consider graphics a must-have tool for managers.

Increases in desktop memory have expanded the resolution of microcomputer graphic systems, encouraging vendors to beef up hardware and software graphics products for micros.

For example, IBM has recently added color graphics displays, expansion cards and graphics software to its line of Personal Computers. And with the 3270-PC/G and 3270 PC/GX workstations — graphically enhanced microcomputers targeted specifically for the mainframe environment — Big Blue is one of the few vendors to have addressed the question of mainframe data base access for graphics users. In addition, high-resolution bit-mapped displays are becoming more and more popular and have been a boon to computer graphics.

Following the lead of other microcomputer software packages, graphics packages have become increasingly user-friendly. More than 70 graphics packages, priced from \$300 to \$700, are now on the market. These include Business & Professional Software, Inc.'s BPS Business Graphics; Decision Resources, Inc.'s ChartMaster; and Graphic Communications, Inc.'s Graphwriter. Most are geared either to presentation graphics or to personal graphics for decision support.

Presentation graphics packages must offer many font styles, line widths and colors; they must also simply look good. Decision support graphics must be highly interactive for quick what-if games, but need not have all the output options.

General Mills, Inc. in Minneapolis, Minn., started implementing a graphics decision support

system for plant productivity this year and is still looking for some of the tools, according to Ronald Miller, graphics support specialist. "No one package out there really stands out," he said. About half of the company's micros have graphics capabilities using both microcomputer and mainframe software.

Although there may be no runaway leader in terms of quality in the microcomputer graphics software market, in terms of quantity the race is not even close. Integrated packages with graphics introduced many users to graphics,

fueled in large part by sales of specialized business graphics packages.

Although some industry watchers predict more packages integrating decision support and presentation graphics, Deborah Barlow, director of marketing communications at Graphic Communications, Inc. in Waltham, Mass., is not one of them. This is not likely, Barlow said, because "people need both analysis and presentation graphics. You can't expect that in one package. It would be too cumbersome to use. The answer is to integrate on the systems level instead of the application level, so that you can use the specialized packages you like best."

Myriad output devices have also developed in part because of the allure of graphics for businesses.

The price of laser printers plummeted from \$30,000 to \$10,000 in the last year, according to Alan Paller, who is president of AUI Data Graphics in Washington, D.C., and is on the board of directors of the San Diego-based Integrated Software Systems Corp. (a mainframe graphics software vendor). That price drop is overshadowed, however, by the reduction in the time a laser printer takes to print a black-and-white chart: five to 10 seconds compared with the three to five minutes needed by other printers.

Although laser printers do not print color, they do print pages containing both text and graphics. For growing numbers of companies that will produce a large number of documents integrating both text and graphics, "laser printers will take a little of the edge off color," Paller said. "People will make a lot of black-and-white charts because it is faster."

For companies that cannot afford or do not need laser printers, or for those that want color output, there are color ink jet printers and color plotters. Both print only graphics, but do so for \$1,000 or less.

According to Steinhardt, the standard dot matrix printer has been extremely successful at the low end of the market. "It will continue to be a major source of output for people who want to make black-and-white graphics and text at low cost," he said.

For users that want color output in 35mm slide form, film recorders such as the \$1,500 Polaroid Corp. Palette can copy images from a microcomputer monitor. When used with certain software packages, these products reportedly produce slides with two to four times the resolution of the monitor.

Some analysts say that, as more companies opt for using graphics software on micros linked in networks, turnkey systems and mainframes will be used less and less for business graphics. Others emphasize the implementation of transparent interfaces between mainframe resident graphics packages and personal computers. Paller said he expects to see Fortune 500

and they still play a big part in the market. The ease of transferring data from a spreadsheet into a chart, and the convenience and low price of having it all integrated makes Lotus Development Corp.'s 1-2-3 and Ashton-Tate's Framework among the most popular programs that produce graphics.

Whether these packages are considered true graphics packages is another story. "Lotus' graphics capabilities are so limited as to be almost negligible," said Tom Treflinger, assistant editor of Datapro Research Corp.'s Datapro Reports on Microcomputers, based in Delran, N.J. No one, however, disputes that much of the business world uses 1-2-3 to make graphs. "1-2-3 cuts into the sales for stand-alone packages," said Marilyn Darling, manager of product marketing at Business & Professional Software in Cambridge, Mass. "If Lotus satisfies 80% of a user's needs, he isn't likely to go out and buy a stand-alone graphics package for a few hundred dollars," she added.

According to IDC's Kelly, 1-2-3 is important in the market, not as a full-featured graphics package but because it "serves to whet people's appetites." She said many users discover personal computer graphics through Lotus' 1-2-3 and then move on to specialized packages with more advanced features.

The market is still far from mature. According to IDC, only 14% of the personal computers in businesses produce business graphics. IDC expects this percentage to top 50% by the end of the decade,

companies implement interfaces allowing micro-generated graphics to be transported up to the mainframe for enhancement and presentation-quality output.

According to Paller, mainframe-based charting systems have sprung up in a number of large companies over the last two years, providing on-line decision support for executives.

"The technology is just arriving for decision support on an economical basis," Miller of General Mills said. "Before, it was quite expensive to do on-line activities." Miller predicted that as more information is made available to graphics users, the information will be used more frequently.

Northrup Corp. of Hawthorne, Calif., installed an interactive charting system a year ago for a vice-president of engineering and his staff of managers. According to Bradley Butcher, a graphics product specialist, the vice-president has access to about 200 charts, most updated weekly. Before the system was implemented, hand-drawn charts were tacked to the walls of one room in the company. "The vice-president and his reporting managers can now go directly to the charts they want rather than scanning an entire wall," he said.

The vast majority of applications involve scheduling staff and resources. According to Butcher, charts provide "a better way to illustrate the parts and current status of a project. You get the big picture a lot quicker."

Some companies, such as the Hartford Insurance Group in Hartford, Conn., have begun to provide microcomputer-based graphics for certain applications not needing extensive data retrieval from mainframe files. This makes it easier for infrequent users to create their own charts.

The graphics stations in the firm's information centers consist of IBM Personal Computers or compatibles with Graphwriter and a Polaroid Palette. They are used primarily for presentation graphics that require input of information by a clerical worker after a manager decides which data and graph style to use, said Phil Archambeault, of the Hartford Group. All the decisions can be made on paper, making the actual

The price of laser printers plummeted from \$30,000 to \$10,000 in the last year. That price drop is overshadowed, however, by the reduction in the time a laser printer takes to print a black-and-white chart: five to 10 seconds compared with the three to five minutes needed by other printers.

production of the graph a clerical job. The firm's mainframe

system is used primarily for decision support. "We have a definite place for

both," Archambeault said. Although computer graphics will surely be

used more frequently and more creatively in the future, the trend of using graphics for decision support will have the greatest impact on business. Said Kelly of IDC: "I can't see that not happening." **QA**

Cogen is a free-lance writer and an editorial intern at Computerworld QA.



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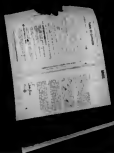
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OA FOCUS:

SYSTEMS SOFTWARE

Software planners and purchasers face a difficult challenge: keeping up to date on the state of the art in software today while charting a course for the growth and development that will be needed tomorrow.

This issue of OA Focus provides help in both areas in order to make your planning and implementation easier.

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DECISION SUPPORT SYSTEMS

BY LEONARD P. BERGSTROM

Forces currently at work within the information processing industry are posing tremendous challenges to both users and vendors of decision support systems (DSS) products and services.

One of these forces is the advent of the information revolution. Another is the growing trend toward computer literacy and acceptance. Together, these two forces have created a dynamic and expanding marketplace, accompanied by extraordinary demands made by end users on suppliers. At the same time, the relentless march of technology continually offers better and less expensive solutions in the areas of hardware, software and communications.

These rapidly evolving factors have profoundly influenced all sections of the industry. They have also helped create a major opportunity — not only for firms in the computer business, but also for the individuals responsible for the delivery of information services within corporations.

Vendors and authors of DSS products have been particularly affected by all this movement. All face the need to effect a quick transition in order to capitalize on the opportunities available and fulfill an expanding list of requirements. Proper resources must be directed in delivering software and ser-

vices which not only meet current and latent demands, but which also integrate evolving technologies and prepare for future challenges.

This situation has led to an extremely competitive environment, characterized by a diversity of approaches, many instances of product overlap and an increasing number of cooperative "arrangements" between companies.

To understand DSS software trends, one must understand three industry forces — the demand for information, the increasing computer literacy and acceptance and the need for integration. End users are basically concerned with three types of information: private (owned and

controlled by the individual or department); corporate (historically owned and controlled by DPs); and public data bases (such as financial, econometric or demographic sources).

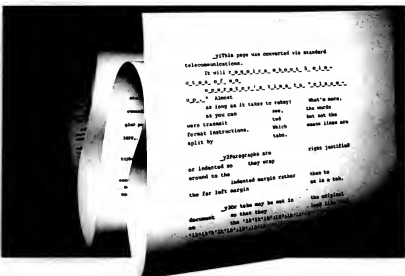
Of particular importance to the end user is the window to the corporate data warehouse. In today's business world, information is a valuable corporate resource, and its access is a critical ingredient to corporate survival and success. The DP organization can no longer regard corporate data as something removed from the everyday world, locked away in Cobol programs. Instead, DP must take an active role in making corporate data available to the broad range of managers throughout the cor-

poration and encouraging the use of this information in as many ways as possible.

Accessing external and corporate information has been a major activity area for many DSS vendors. Software must provide either direct access to summary and aggregate data residing in production systems or must closely interface to data base management packages like Information Builders, Inc.'s Focus and Mathematica Products Group Inc.'s Ramis II, traditionally the gateway to corporate information resources.

Similarly, in the external data base arena, many software products support a wide variety of offerings. Two good examples are marketing and econometric information. Analect (OR/MS Dialogue, Inc.), Express (Management Decision Systems, Inc.) and Strategem

DP must take an active role in making corporate data available to the broad range of managers and encouraging the use of this information in as many ways as possible.



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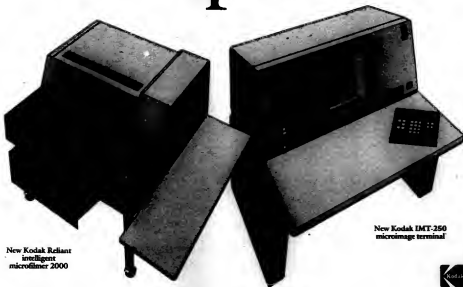
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(Integrated Planning, Inc.) all support Sami, Nielsen and Majers data, used in market research and analysis departments in the consumer goods industry. In the econometric area, Fame (Citicorp Information Services) directly accesses Citibase, and Xetim (Chase Decision Systems) supports Chase Econometrics.

One of the interesting trends in software on the information center level is the blurring of the traditional distinction between financial and data management systems. In our benchmark-based reports, *Financial Modeling Decisions* and *Data Management Decisions*, more and more products qualify as able to handle the different problem sets necessary to be included in both publications. Until recently, few products could successfully complete entries for both these reports. Currently, Analect, Express, Nomad 2 (D&B Computing, Inc.) and SAS (SAS Institute, Inc.) are represented in each published report. A number of others will soon be completed, including AS (IBM Information Network), EMS (Economic Sciences Corp.), FCS-SPS (FCS, Inc.), Interactive Financial Planning System (IFPS from Execucom Corp.) and System W (Comshare, Inc.).

More of the financially based systems seem to be adding stronger data management capabilities than not. Data management has traditionally been one of the weakest aspects of DSS systems. To shore up this deficiency, DSS products have appeared with integrated multidimensional data

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bases; others have developed hierarchical consolidation systems or interfaces to relational data base management systems. Three products have modified the public domain version of RIM to beef up capabilities in the information management sector.

Understanding the increasing computer literacy and acceptance is another key to meeting the challenge of the future and more business schools are requiring students to purchase a personal computer before admission. This literacy does not imply that all current executives will buy a micro, roll up their sleeves and begin programming. It does indicate that decision makers will have a better understanding of the current technology and what can be accomplished with it.

By accepting automation, members of the new generation of managers are increasing their own productivity, as well as contributing to the overall use of automation in the work place. This growth has caused coincident booms in microprocessing, spurred the need for sophisticated communications and established the information center as an integral part of corporate structures.

With the advent of the 16-bit micro with its larger addressable memory size and the plummeting cost of peripheral storage, more DSS authors are developing micro versions of their products. Although a few vendors still employ the ostrich approach to personal computing, this attitude is rare. Microcomputer software is a hot button in the industry today. Minimally, an interface must exist to popular or existing products.

Although the vast majority of DSS software vendors have jumped on the distributed bandwagon, the approaches, styles, capabilities, delivery and pricing vary as much as those of the mainframe versions. These products can be grouped into two general categories: subset and full versions of mainframe functionality. The list of these products is much too long to cover in detail, but several examples will highlight general capabilities and common concerns.

One philosophy utilizes the personal computer (or the functions for which it is best suited: modeling, reporting, information maintenance and so on. Boeing Computer Services Co. embodies this philosophy in the EIS micro workstation, which provides mainframe communication and emulation of EIS full-screen capabilities, local data collection and modification, 3279-style color graphics and links to popular Calc products. On the IBM PC, the predominant delivery vehicle in the arena today, the user can operate either on-line or locally and is easily allowed to switch back and forth between the two modes.

Many leading DSS vendors offer subset versions of their products. These include several of the more well-known industry names

A SAMPLE OF AVAILABLE FINANCIAL MODELING SYSTEMS

Anasoft
OR/MS Dialogue, Inc.
New York, N.Y.

CA-Anasoft
Computer Associates
International, Inc.
Jericho, N.Y.

Command/MS
Decision Software
Systems, Inc.
New York, N.Y.

Command/MS
Context Management Systems
Torrance, Calif.

Control Strategist
Xerox Computer Services
El Segundo, Calif.

CPL/Tactix
Mercer Planning & Sprak
Stockholm, Sweden

CMS/Finall
Dun & Bradstreet
Computing Services
Wilton, Conn.

Cufo-86
Cuffs Planning
and Models, Ltd.
New York, N.Y.

ESB
Boeing Computer Services
Seattle, Wash.

Empire
Applied Data Research
Princeton, N.J.

ESB
Economic Systems Corp.
Berkeley, Calif.

Encore
Ferox Microsystems, Inc.
Arlington, Mass.

EPS
Data Resources, Inc.
Lexington, Mass.

Empire
Management Decision
Systems, Inc.
Waltham, Mass.

FCB-EPF
EPS, Inc.
Wintham, N.H.

Forenight
Information Systems
of America, Inc.
Norcross, Ga.

FRP
STSC, Inc.

Rockett, Md.
ESB
Management and Planning
Software Group
Toronto, Ont.

EPF
Execucum Systems Corp.
Austin, Texas

Impact
MDCR, Inc.
East Brunswick, N.J.

Impact
Schofield Associates, Inc.
Evanston, Ill.

Maps/Model
Ross Systems, Inc.
Palo Alto, Calif.

Model
Lloyd Bush and Associates
Dallas, Texas

Powerplan
Quint Systems, Ltd.
Ottawa, Ont.

Prophet II
Via Computer, Inc.
San Diego, Calif.

QSD/Impact
QSD, Inc.
Great Neck, N.Y.

SAS
SAS Institute, Inc.
Cary, N.C.

Simplex
Simplex Systems, Inc.
Chapel Hill, N.C.

Spread
LAL Products, Inc.
Hancock, N.H.

Integrated Planning, Inc.
Boston, Mass.

Synapse
Comshare, Inc.
Ann Arbor, Mich.

General Electric
Information Services Co.
Rockville, Md.

TRM
Comshare Target Software
Atlanta, Ga.

Excel
Chase Econometrics/
Interactive Data Corp.
Waltham, Mass.

as Execucum Systems Corp. (IFPS/Personal), Comshare, Inc. (Micro W), EPS, Inc. (Micro FCS) and Xerox Computer Services (Control). Generally, all two-dimensional capabilities are found in the micro version, leaving the mainframe environment for more complex tasks like hierarchy consolidation or activities requiring heavy I/O or data management needs such as risk analysis. One author, Lloyd Bush, has four separate micro-based offerings, the top end of the line very similar to the mainframe version.

Among the other software vendors that have implemented micro versions with 100% capability are the following: Command/DSS (Decision Support Systems, Inc.); CPL/Tactix (Mercer Planning & Sprak); PPS/PC (STSC, Inc.); Maps/Pro (Ross Systems, Inc.); Micro Forenight (Information Systems of America, Inc.); Micro Impact (MDCR, Inc.); Prophet II (Via Computer, Inc.); and Spread (L & L Products, Inc.).

All these products offer built-in

communications, and the vast majority take advantage of the screen-oriented features of the microcomputer and its strength in the area of user interface. Other trends that emerge in the field are the inclusion of the Vis-like capabilities (such as the statement, "the equivalent of any Calc product"), the use of C or Pascal as the underlying development language and aggressive volume discount policies. It is worth noting that another stand-alone micro product, Encore by Ferox Microsystems, Inc. actively interfaces to the most popular mainframe offerings.

These developments offer real hope for the manager of corporate in-house time-sharing services in providing distributed DSS while solving some of the control, planning and support problems engendered by the rapid proliferation of microcomputers in departmental and other end users' hands.

The availability of compatible microcomputer and mainframe DSS products with built-in communications will satisfy the de-

centralized, stand-alone user. In addition, a pattern of growth is available when applications expand beyond initial expectations; require the networking of data, models or reports; and demand the processing capabilities and sophistication of the mainframe.

One of the most pressing concerns of DSS users is integration, and this subject poses challenges to suppliers on several levels. The needs vary relative to hardware, software and end-user viewpoints. In the hardware area, numerous decision support centers are faced with the problem of interfacing micro, mini and mainframe software, many times involving diverse operating systems and manufacturers. Some DSS products run on multiple environments or, in the IBM arena, with compatibility VM and MVS versions. This flexibility in delivery systems is especially important to large organizations with multiple decision support center offerings.

Two approaches have been used to satisfy various DSS requirements. One philosophy says that everything needed by the user should be embedded in a single system; when the user is in that system, everything is readily available for use. Other systems adopt the philosophy of concentrating on specific activities; they provide interfaces with data base management systems, with graphics packages, risk analysis, time series analysis, statistics and others. A popular example of this approach is named Fita (Focus, IFPS, Tell-A-Graf, SAS).

In the hardware and software issues of integration, the DSS user must be aware that the presentation of integrated solutions is often more of a marketing concept than a practical reality. It is advisable to scrutinize each vendor's claims closely.

A final challenge to the DSS vendor is the need to provide user-educative software — user-friendly is no longer enough. A comprehensive solution orientation is required. DSS software must be able to grow with increasingly sophisticated user needs and must be attractive to all types of users. DSS vendors have responded by increasing their efforts in such critical areas as documentation and education, full-screen interfaces, expert systems and quality support and delivery.

In conclusion, the demand for information, the greater computer literacy of the population and the proliferation of increasingly sophisticated micros along with the need for integration have brought heavy pressures to bear on DSS vendors. The vendors that succeed will be the ones providing total solutions. Because of the rapidly evolving marketplace, users of DSS should regularly evaluate their software offerings. **OA**

Bergstrom is vice president of marketing and a principal of Real Decisions Corp., a consulting and research firm in Darien, Conn.

KNOWLEDGE-BASED SYSTEMS

BY ROBERT KELLER
AND PETER TOWNSEND

One of the world's first knowledge-based expert computer systems, a program called Dendral, was begun in 1965. "Knowledge-based" refers to a system's ability to perform tasks at the level of a human expert, and Dendral's task was to emulate a human expert's performance in deducing the molecular structure of a compound, given its chemical formula and some mass spectrographic data.

Today the technology of expert systems has produced several successes and propelled the field of artificial intelligence into the public view. Systems have appeared that have raised hopes of truly intelligent computer assistance

for professional experts in any discipline.

Two of these are Stanford University's *Mycin*, which performs diagnosis of bacterial blood infections at a level of competence reported equal to those of the best physicians, and *Xcon*, which was developed for Digital Equipment Corp. to provide expert assistance in configuring the VAX line of computers.

Most early expert systems, however, were aimed at solving problems in scientific and engineering areas. Only in the last two or three years have workers in AI begun to apply knowledge-based systems to business problems.

There are now many start-up AI companies interested in developing, for business and industry, products that exploit the fruits of research in expert systems. To date, although several companies are nearing the end of their development phases, very few have successfully released a commercial knowledge-based product.

Application generators: Expert system application generators are more common than knowledge-based products. These application generators possess "the ability to reason in a way similar to human reasoning, but are independent of any particular area of specialization. To use such a product, a human expert must enter extensive knowledge of a domain, a task that may take months or years. (A knowledge domain is an area of expert endeavor; an expert in that area is a domain expert.)

Among the excellent media for the company that wishes to build a proprietary knowledge base are products such as *Timin* (General Research Corp., Santa Barbara, Calif.); *SI and MI* (Telknowledge, Palo Alto, Calif.); and *KEE* (Intelli Corp., Palo Alto, Calif.). The products generally possess one or more techniques for representing knowledge and can apply different techniques of reasoning, depending on the requirements of the domain being explored. In addition, they include fairly user-friendly interfaces to help the expert develop a complete and consistent compilation of the expertise gained over many years of practice.

Knowledge-based products: Easier to work with is a generation of intelligent products that come with a predeveloped knowledge base for a particular domain. Several would-be AI vendors are known to be working on such products, although many of them prefer not to have their developmental efforts publicized.

The first company to have released an off-the-shelf knowledge-based product is Intelligent Business Systems (IBS) of New Haven, Conn. IBS markets a complete general accounting software package along with the hardware needed to run it. The IBS accounting package runs on a VAX 730.

Included in the package is an

extensive knowledge of accounting practices and a query facility, *Easytalk*, which allows users to ask sample accounting questions in natural English.

For example, in addition to asking questions based on ample retrieval queries—such as "How many IC96's do I have in stock?"—the user can assume the system understands relationships in a bill of materials. The user could, for example, ask, "How many IC96's do I need to build 300-dozen level-2 tractors?" Even more complex reasoning is available to answer such questions as "How many of them should I stock to fill an order of this size next time?"

The successful IBS release of *Easytalk* and its companion accounting software is one of the first signs that knowledge-based systems are ready for the commercial market. Many more such products are likely to follow.

Two other areas being explored for knowledge-based applications are risk management—particularly in the insurance industry—and financial planning. Although these two areas are receiving substantial attention just now, any area in which people are clearly expert at some task is a candidate for knowledge-based system application.

Among the most credible young contenders in the insurance field is *Syntelligence* (Menlo Park, Calif.), which has the services of several well-known AI people as well as experienced business management, and which is believed to have completed a prototype knowledge-based underwriting system for a major New York casualty insurance company.

Although this work cannot yet be considered a commercial product, it represents successful groundwork from which a series of knowledge-based products could evolve.

Features of knowledge-based products: Although phrases such as "user-friendly," "smart systems," and "help facility" have been in use for some time now, the new generation of knowledge-based products is giving the terms decidedly enhanced meaning. Further, in addition to much deeper domain knowledge than traditional software products, knowledge-based products exhibit something like self-awareness in the sense of being able to explain why they took certain actions and also being somewhat aware of what they don't know.

At this time, *Courtier*, a system in the financial planning area, stands out as an excellent example of the features that should be expected from most future knowledge-based products. *Courtier*—French for broker—is a security portfolio advisory system developed at Cognitive Systems, Inc. (New Haven, Conn.), for installation in the lobbies of most branches of a major Belgian bank. Its purpose is to provide high-quality investment advice to customers of the bank, without the need for highly-paid investment analysts in each branch.

Because of natural language user interfaces that possess a deep knowledge of the user's situation, knowledge-based products can come much closer than previous products to the user-friendly ideal—being able to get what I want from the computer when I want it and without help from anyone else.

Courtier, for example, is to be used directly by the bank's customers, regardless of whether they have ever used a computer system before. The system, which will accept both conversational French and English input, offers specific recommendations about stock purchases and portfolio distribution and will also answer factual questions about the Belgian stock market.

For a new customer, *Courtier* conducts an interview to collect information about the user's financial situation. Then, based on the user's current portfolio distribution, common sense investment practices and current market conditions, *Courtier* gives advice about which stocks to buy or sell.

Although *Courtier* can conduct an interview with a customer and offer investment advice without any prompting from the user, the user may interrupt at any time. The user can then express likes or dislikes or ask questions about an individual stock, the advice given or investment matters in general. This mixed-initiative user environment is another essential aspect of the meaning of user-friendly to the new generation: The system has the expertise to operate in a free-running mode, but its self-determination can always be overridden by the user.

Depth of knowledge: Knowledge-based generally means an extensive collection of facts, rules and guesses which an expert in a domain uses in achieving expertise. The knowledge base in essence is a model of some human expert. *Courtier*, for example, is a model of an expert human investment adviser.

Like a human financial analyst, *Courtier* can give detailed investment advice only if it has a detailed financial profile of the customer. *Courtier* gives the customer the option of completing a brief or in-depth financial questionnaire, including current investments, assets and liabilities and cash available for investment.

Based on this information, *Courtier* may make stock recommendations or it may determine that, according to its built-in investment policy, the customer's assets are not large enough to warrant investments in the stock market. As always, the customer can choose to override the system's recommendations.

If the customer decides to invest in the stock market despite *Courtier*'s recommendation to the contrary, the system would present a recommendation to the stock purchases appropriate to the customer's financial profile and current portfolio.

At this point, the customer could say, "I don't want any utilities," and *Courtier* will respond by revising the portfolio to reflect this preference.

Self-awareness: One of the more frustrating aspects of traditional query facilities is that they tend to interpret questions too literally and provide answers that are less than the user really wants. Knowledge-based products have the means to discover the real question that's being asked and to provide a meaningful answer. *Courtier*, for example, uses its knowledge of the market to provide helpful answers to questions where a simple yes or no might be adequate. For example, a customer might ask, "Should I buy SGB?" A simple yes or no would be adequate, but *Courtier* is more likely to respond with something like "Soc. Gen. de Banque would not be a bad investment [it has average market performance]; however, Seditbank would make a better investment in the banking sector."

As another example, assume the system has only current price and earnings data available and that the customer has asked for a five-year history of price and earnings for SGB. Data base query systems are likely to tell the user the question cannot be answered. In contrast, the knowledge-based system is aware that it can't answer the question as asked, but that it can answer some part of the question. Its belief system suggests that some part of the answer is better than no answer at all.

Courtier would produce an answer such as, "I do not yet have historical data available. However, this current data may be useful: The price-to-earnings ratio for SGB is 6.3."

Research applications of knowledge-based technology that have been done are many and are generally discussed in the literature. They have served well in their roles as precursors of a possible future for intelligent computer systems. However, a second generation of systems is now bringing this potential into reality in ways that can benefit everyone.

Both through systems that allow expert personnel to transmit their own expertise to the machine and through knowledge-based off-the-shelf products, the computer is being transformed from a widely accepted, competent clerk into an intelligent professional. □

Keller, president of Renaissance International Corp. in Harvard, Mass., consults both with vendors and users of AI products.

Townsend, president of Branding Systems, Inc. of Wilmington, Del., is a systems consultant who teaches management-oriented AI seminars for Renaissance International.

SUPPORT TOOLS FOR MICROCOMPUTING

BY ANN L. MORLEY

End users are finding themselves faced with a wide array of technologies. The range of this technology is good evidence that no single blueprint will meet the requirements of architects charged with the design and maintenance of productive personal computing.

A company that attempts to organize for managerial productivity will find its ability to do so is influenced by many support tools, among them financial modeling and planning systems, fourth-generation DBMS-based languages, graphics software, spreadsheets, text processing and retrieval packages and natural language query systems.

Furthermore, their implementation on mainframes,

minicomputers and/or personal computers and their ability to connect with users intra- or inter-campus merely enhances the architect's opportunity to fashion a tool that takes into account a number of organizational considerations.

The information systems manager in many instances will find that the current crop of decision support tools is composed of familiar faces. Academia and industry pundits have envisioned a comprehensive system with highly general ways of handling information, but this system is far beyond the capabilities of the offerings on the marketplace today. Users, as a result, are looking at discrete solutions to meet the

short-term requirements of end-user constituencies. Suppliers of single-purpose systems tools and languages are investing significantly in enhancements for broader-based decision support or are looking for third-party alliances for products that complement their own.

Organizational decision makers will continue their cry for improved software as hardware resources are distributed throughout their firms.

Application tools most frequently implemented for decision support read like an excerpt from the table of contents of any major packaged software directory. This article will briefly review the programs organizations are using to

solve ad-hoc information needs and will look at what users can expect from software developers in the coming year.

Among the first to embrace the concept of decision support were a group of software houses and time-sharing companies offering programs developed in the 1970s to automate financial modeling and planning applications. These companies were a clearcut example of what the marriage between computers and management science might produce, and they became vigorous proponents of DSS in the '80s. The market for this type of application will top \$587 million this year, according to International Data Corp. (IDC), the Framingham-based market re-

search firm. Of that amount, \$405 million will find its way into the pockets of the remote computing firms.

Market dynamics favor the packaged software supplier: these firms can expect to grow at a rate of approximately 40% compounded over the next five years. Moreover, IDC data indicates that at the end of 1983 only 10% of U.S. IBM mainframe sites had, in fact, implemented financial modeling and planning systems.

Users will find more and more companies competing for their dollars. Some are industry stalwarts, like Execucom Systems Corp. (Austin, Texas), Management Decision Systems (Waltham, Mass.) and Evaluation and Planning Systems, Inc. (Windham, N.H.). Others are new entrants like Comshare, Inc. (Ann Arbor, Mich.), Infotym (Cupertino, Calif.), Fame Software Corp. (New York, N.Y.) and a host of vertically niched companies enhancing their industry-specific offerings with planning and forecasting features.

The spreadsheet pioneered the widespread use of personal computers for financial budgeting and forecasting. In large and small businesses, however, there exists a group of users who desire access to some features that only modeling languages support. Ferro Microsystems (Arlington, Va.) and Addison-Wesley (Reading, Mass.) have targeted this particular customer, as have the mainframe software companies, which are steadily announcing personal computer versions of their software. For example, Comshare's clientele have access to Micro W; Execucom is shipping IFPS/Personal; Lloyd Bush and Associates (New York, N.Y.) is marketing Simple Basics; and Information Systems of America (Norcross, Ga.) is providing Micro-Forecast.

The marketplace for modeling applications on personal computers is predicted to grow at an annual rate of approximately 78% compounded over the next five years. It is exactly the kind of application users will want to distribute as more powerful machines and workstations become the order of the day.

In 1984, integrated and integrating software became the defining characteristics of the personal computer software industry, and they are becoming the pivotal strategy of large systems software houses as well. The integration of broad-based applications — graphics, report generators, data base management, spreadsheets and queries stems from two not-incompatible growth opportunities: the need to bring incremental revenue from an expanding product line and the requirements of end users for friendlier front ends. As a result, vendors of financial modeling and planning systems face some competition from the likes of information Builders (New

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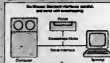
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York, N.Y.), Mathematica Products Corp. (Princeton, N.J.), D&D Computing Services (Wilton, Conn.) and Infodata Systems (Falls Church, Va.). These four vendors dominate the marketplace for fourth-generation DBMS-based languages, which are now festuring a complement of statistical and analytical tools.

In spite of marketing literature to the contrary, the financial modeling and planning system is distinguishable from the fourth-generation DBMS-based language. Financial modeling and planning systems analyze alternatives using conditions set up in models. These systems typically perform complex operations on relatively small sets of data. The fourth-generation DBMS-based language optimizes inquiry, management, validation and especially reporting of large amounts of data.

As users confront requirements in 1985 and beyond, they will find they need to both manipulate and manage data. Two factors make this issue more urgent, especially in view of the rapid expansion of the user population. Those factors are the increasing acceptance of the information center and the distribution and sharing of corporate information resources, embodied for the time being by the micro-to-mainframe link.

The quantity and detail of data available for users of spreadsheets and modeling systems is skyrocketing. Users, looking to external sources like the on-line data base services vendors, are simultaneously expecting MIS to make available information residing on production systems.

Professionals supporting in-house clients have always been challenged by the need to control, coordinate and secure the corporate data resource. As a result, they have been very receptive to the strategies leading data base management systems (DBMS) vendors have evolved for developing and safekeeping the information center data base. More often than not, the information center is the organizational entity through which end-user requirements are managed at large sites. At year-end 1983, for example, almost 80% of U.S. sites supporting an IBM 3080 series had implemented or were in the process of establishing an information center, according to IDC data.

The impetus behind the DBMS shops' effort to exploit new opportunities in end-user markets is threefold: the commercial viability of relational data base technology; the long-term attraction to users of integrating the piecemeal solutions that have characterized the business environment in the early and mid-1980s; and the additional revenues they can generate from multiple DBMS licenses.

Vendors offering relational DBMS or software that supports relational views of data include IBM, Cullinet. Software (Westwood, Mass.), Applied Data

Research (Princeton, N.J.), Oracle Corp. (Menlo Park, Calif.), Relational Technology (Berkeley, Calif.), Data General, Cincom Systems (Cincinnati, Ohio) and a host of others.

Software shops are accommodating the requirements of end-user data base management in two different ways. Independents like Cullinet and Applied Data Research believe users are best served by one DBMS capable of supporting production and end-user applications. Others — IBM, for example — would have MIS support one type of DBMS for production systems and another for end-user and OA systems.

The introduction of DBMS technology into the information center and the demand of end users for organizational data have spawned the implementation of micro-to-mainframe links. These links allow host computers to support decision support applications on personal computers; quite frequently they provide the user with an alternative to mainframe- and mini-based planning or spreadsheet systems. The resounding success of companies like Lotus Development Corp. (Cambridge, Mass.) in corporate America has brought new opportunity to large systems software houses that are complementing their products with micro-based analytical tools.

By and large, two kinds of link products are available. The first — probably the one that will predominate over time — is the broad-based generic link that supports a wide variety of file structures. Inforlink (Woodland Hills, Calif.), Cullinet and a host of new entrants like Carleton Corp.'s CQS-Infolink (Cambridge, Mass.) are representative examples of this type. Cullinet has gone so far as to strike up agreements with Data General and Digital Equipment which allow their customers access to data residing in end-user files on IBM mainframes for manipulation on (typically) DEC or DG workstations.

The second type of link is delivered by vertically niched companies like McCormack & Dodge (Natick, Mass.), Management Science America (Atlanta, Ga.) and Software International (Andover, Mass.). These products allow users access to the transaction data generated by the applications each software house has installed for downloading to the personal computer.

The implementation of micro-to-mainframe links has been slow, in part because of maintenance, security, and cost considerations. Their implementation over the next year will cement many advantages the micro has already brought to the development of the user interface. A large proportion of local computing resources will become dedicated to turning the workstation into a front-end unlike those that currently exist for decision support. Software developers constantly monitor the evolution of touch screen technology, the mouse, natural language queries and

Model	IBM Sites	Other Work- Safe Centers	%	Other Work- FC Sites	%
AR 3080	14	1	7.1	—	—
AR 370	118	8	7.8	11	9.0
4381	118	8	8.1	18	13.0
4381-1	38	3	6.1	3	9.3
4381-11	8	—	—	—	—
4381-2	126	12	8.8	18	14.4
Subtotal	378	30	7.3	37	10.8
4341	202	31	16.3	38	17.8
4341-10	13	1	7.7	3	18.4
4341-1	85	16	18.8	11	12.8
4341-11	13	3	23.1	7	50.8
4341-2	141	38	35.5	38	26.4
4341-4	7	1	14.3	—	—
4341-12	35	8	21.7	4	11.4
Subtotal	484	98	19.3	68	18.9
3081	34	11	32.4	9	26.5
3082	8	39	—	—	—
3083	64	29	46.3	24	37.5
3081	61	36	59.0	33	53.7
3083	48	26	58.3	19	39.6
Subtotal	313	104	49.1	78	38.4
Total	1,108	238	20.8	216	19.6

Sites defined by this primary CPU. Chart © IDC.

Use of information centers at IBM sites, year-end 1983

more sophisticated Help facilities.

The major challenge faced by users grappling with the promise of decision support technology is the integration of discrete computer-based activities into an institutional information resource. As the above analysis makes clear, no single approach currently comes close to serving diverse user groups. Although tremendous strides have been taken by software vendors trying to marry new technologies with old, significant challenges remain. Management scientists, for instance, voice concerns about organizational productivity while software developers attempt to leverage advances in communications architectures and standards and the

possibilities inherent in expert systems, portable operating systems and the like.

How these issues will be resolved for market consumption will be the subject of endless speculation. One thing, however, remains absolutely unquestioned: users have had a phenomenal impact on the economics of information processing. **OA**

Morely is senior software consultant in the Professional Services Group at International Data Corp. Statistical data in this article are from two of her more recent efforts: "Trends in Decision Support" and "The IBM Software Environment."

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INFORMATION CENTERS: SOLUTION OR PROBLEM?

BY NAOMI KARTEN

While information centers are busily attending to users' micro needs, programmers are feeling their security being pulled out from under them by rampant end-user computerism. And, at the same time they are becoming an increasingly potent user tool, personal computers seem to be accentuating the rift between users and data processing.

Given the exploding demand for user access to computerized information, DP senior management and information center planners had predicted that transferring some of the load to users would help relieve the burden on DP. This, in turn, would help reduce the adversarial nature of the user-DP relationship. Yet, if anything, the conflict is

increasing. Information centers — intended to be part of the solution — may inadvertently be contributing to the problem. Expanding the information center scope to support both users and DP may be a worthwhile strategy.

In providing services to both users and DP, information centers could stay on top of the issues and concerns of both sides. Rather than contributing to the conflict, information centers would help improve overall data resource management through increased understanding of the data needs of users and DP.

Information centers thus far have been the key to fourth-generation and personal computer technology in many companies. Neither users nor DP can go it alone. Expanding the scope of the information center would permit a unified approach to training and support and might help ease DP into the new reality in which both users and DP have a piece of the technical action.

This approach would also help ease DP's antagonism toward information centers. Initially, DP departments largely ignored the single-minded orientation of centers toward the support of users in the newest technological tools. IBM recommended that information centers promote this concept to DP in order to gain acceptance, but many tended to forget DP in the eagerness to get users up and running.

Information center personnel, selected for their service orientation and patience, tended to thrive on this dedication to users. Ask such personnel why their company has an information center. Most will talk about user needs for access to data. They'll describe user productivity. They'll refer to users' needs for decision support capabilities. And — not to be forgotten — they'll remind you of the ever-growing application backlog, which, at least in theory, users can help to reduce.

Ask these people whom they support, and they'll say the financial, or planning, or marketing people or whichever segments of the user community they've been working with. Rarely will they list DP as a recipient of their services, even if they do in fact provide a modicum of support to their DP peers.

It's not surprising that in pre-micro days this

"pure user support" approach was successful. From the beginning, information centers attracted corporate users eager for computer skills. Users learned to prepare analyses and generate reports within hours and days, compared with typical DP timeframes of months, years — or never. In spite of mainframe software that, in its infancy, was of-

ten user-hostile at best, users demonstrated an ability to use fourth-generation languages to an extent unanticipated by DP user-watchers.

DP departments grudgingly accepted the fact that information centers were teaching users to do things DP didn't really want to do — boring reports and repetitive analyses of analyses. Centers

took some heat off DP and reduced the interruptions in DP's day (incidentally making it more difficult for DP to blame project slips on user demands for ad hoc support). DP was able to get on with its business of developing and managing production systems and — overall — being in charge of computer technology and the use of computers in the

corporation.

As more and more users took on mainframe programming responsibilities, however, it became apparent that DP was no longer completely in charge. Users were being encouraged to learn the newest mainframe languages, the graphics packages and the full range of micro spreadsheets, data managers and word crunchers — and DP



wasn't. As DP's total responsibility for all things in corporate computerdom diminished, the user-DP relationship headed simultaneously in opposite directions.

In some DP departments, terms like "partnership" and "synergy" started to be heard. With information center training, users were able to describe their business

needs to programmers in accurate technical terms. Programmers, in turn, were able to report on project status in terminology meaningful to users. Users and programmers were working together better than ever.

In other DP departments, the relationship worsened. Using fourth-generation languages, users were turning out

programs faster than their third-generation Cobol-bound DP peers. Instead of a partnership, a strong sense of turf politics emerged. Many of these programmers — and their managers as well — began to perceive the information center as responsible. Included in that perception was a view of information centers as part of the DP organization, but working

to aid and abet users to encroach on DP's territory.

As personal computers stormed onto the corporate scene, the situation took a plunge for the worse. Regardless of whether DP support has been generously offered, rigidly implemented or totally withheld, users have been able to become computer-savvy. No DP policy can prevent a user from using

a home computer, reading a personal computer magazine or visiting the corner computer store for a demo of the latest dazler.

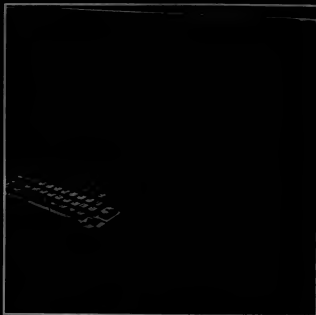
To make matters worse, users find personal computers exciting; a new, different and often better way of getting the job done. Many programmers, immersed in the development of mainframe systems, are either uninterested in "moving down" to personal computers or are prevented by their management from taking time to learn this new technology. Some programmers, amazingly enough, are intimidated by personal computers and anxious about their ability to use them properly. The result is that many programmers are less familiar than their users are with micro technology.

Of course, it's not personal computers per se that DP resents; rather, it's what this technology represents. Personal computers symbolize to DP the loss of power and authority and control over users. And this situation is absolutely irreversible: DP will never again be completely in charge of the use of computer technology in the corporation.

Given the fragile nature of the DP ego, this situation is difficult at best. But it can be turned into an opportunity by information centers. Information centers can expand the scope of their mission and their mode of operation to support both users and DP. The modifications in training, support, staffing and overall management are small, relative to the potential benefit in the user-DP relationship.

The first step is to examine the center's original mission, goals and objectives. A new term — referring to both users and DP — is needed. Almost every option seems sure to offend someone. An information center that can come up with an all-encompassing designation will be a step-and-a-half ahead in one center implementing this expanded model, statements of mission, goals and objectives include the following:

Mission: to provide user and DP personnel with training and support in proven mainframe fourth-generation and micro technology which will aid them in carrying out their respective responsibilities.



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Goal: to assess new hardware and software which provide productivity aids for business analysis or systems development and to make recommendations to management for acquisition and implementation.

Objective: to provide, during the first six months of operation, a formal overview of micro fundamentals to at least three representatives of each major functional area of the company.

Goals and objectives still revolve around tools, training, support and consultation, but they now explicitly take into account both user and DP needs and responsibilities. When objectives have been formulated, the impact on existing support activities and

staffing requirements can be assessed.

The types of training generally offered to users — computer-based, classroom or one-on-one — are equally appropriate for DP. DPs also benefit from more technically oriented training, and many vendors offer courses geared specifically to DPs.

For group-oriented training, initially users and programmers can be trained separately. This prevents new users from being intimidated by "techies," and keeps programmers from feeling slowed down by users. Equally important, it spares programmers from embarrassment in the presence of users who may know the subject area better.

Staffing implications of extending services to DP are obvious. Just as no one understands a user's business problems better than a user, information center support to DP can be provided best by people technically experienced and familiar with the DP environment. Information centers that have drawn their staffs heavily from user areas may need to increase their technical strength. However, because most centers have been at least partially staffed by people from the DP ranks, the balance between representatives of DP and user areas may be able to remain exactly as is. A technically-oriented person capable of delivering training to programmers would be a major

plus. Management of an information center supporting DP as well as users requires close contact with both DP and user management. The extensive overlap of the needs of both groups often exceeds what may be anticipated at the outset.

With computers of all sizes now in the corporate domain rather than users' exclusive realm, respectability of DP, several companies have found joint planning to be effective.

Under information center direction, a joint committee of user, DP and information center representatives meets regularly to work out the most effective approach to responding to the common needs of both groups, while ensuring that each gets adequate attention to its unique needs. This approach often results in a pooling of re-

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sources, resulting in a level of overall support beyond that generally feasible through information center resources alone.

A benefit already emerging in some centers is the development of technical aids to improve the functioning of the tools in use. Programmers frequently complain about the CPU-intensive nature of fourth-generation software. Although users have developed workable — necessarily efficient — technical solutions to their business problems, programmers are eager to devise techniques to maximize efficiency.

A hoped-for benefit is that users and programmers will begin to view each other as peers. By jointly attending company user group meetings, product demonstrations and planning sessions, users and programmers can learn more about each others' responsibilities. In the days of second-generation technology, users and programmers shared a sense of mutual respect and worked closely to solve business problems with technical solutions. Perhaps, after a trying third generation, the fourth generation can once again experience this type of working relationship. CA

Karten is president of Karten Associates, a Randolph, Mass., management consulting firm active in information center planning and the management of end-user computing.

RAMIS II...THE LEADER BY DESIGN

TIGHTENING CONTROLS ON MICRO-BASED SOFTWARE

by J. J. F. O'NEILL

"There is nothing like a noose to concentrate a man's mind."

—SHERLOCK HOLMES

When a computer program is written, it is often done in a hurry. The programmer may not have the time or the resources to test the program thoroughly. As a result, the program may contain errors that could cause the computer to malfunction.

One way to avoid this problem is to use a program that has been tested and found to be reliable. Another way is to use a program that has been written by a professional programmer. Both of these methods can help to ensure that the program is free of errors. However, there is a third method that is often overlooked: the use of a program that has been written by a non-professional programmer. This method can be very effective, but it requires a great deal of care and attention.

When a non-professional programmer writes a program, he or she is often motivated by a desire to learn. This can be a good thing, but it can also be a bad thing. The programmer may not have the necessary knowledge or experience to write a reliable program. As a result, the program may contain errors that could cause the computer to malfunction. To avoid this problem, the programmer should be given a great deal of guidance and support.

One way to provide this guidance and support is to use a program that has been written by a non-professional programmer. This method can be very effective, but it requires a great deal of care and attention.

When a non-professional programmer writes a program, he or she is often motivated by a desire to learn. This can be a good thing, but it can also be a bad thing. The programmer may not have the necessary knowledge or experience to write a reliable program. As a result, the program may contain errors that could cause the computer to malfunction. To avoid this problem, the programmer should be given a great deal of guidance and support.

leaving themselves open to disaster, and when trouble occurs, it will often be MIS that is called in to untangle the mess.

"Probably a majority of corporate PC users are quite lost in the use of DBMS (data base management systems)," said David Ferris, president of Ferris Corp., a San Francisco-based personal computing consulting firm.

"There's a whole class of important applications for which micros are not really appropriate. Data base systems are, in some cases, grotesquely misused. These small systems can evolve into rather insidious monsters."

Ron Ross, editor of the "Data Base Newsletter," added, "It's a very critical and highly dangerous problem. It represents a

real dilemma for people planning the data resources within an organization. Do we keep hands off and let people discover their own limits or do we try to help them with standards, training and other areas?"

Experts agree there is probably little MIS can do to deal with mistakes that have already been made. It can, however, be aware of

the most common flaws with end-user developed programs and the steps that can be taken to avoid them.

For one thing, most applications that become critical do not start out that way. As a result, they are rarely designed with the idea of widespread use in mind. "The users may just start using [the application] themselves," Fer-

ris said. "Then they start their bookkeepers using it and maybe later their sales people, and it follows from there. The data base becomes embedded into the operations of the department."

As the program grows in scope and importance, it is often modified with little regard for the future. "Like a newspaper, it's a lot of information thrown together with no systematic organization," said Chris Rivers, president of

NEAX 2400 IMS: office automation à la carte.

WHEN SHOULD YOU WORRY?

How can a nontechnical end-user know if he is over his head when setting out to develop an application? David Ferris, president of Ferris Corp., a San Francisco-based personal computing consulting firm, recommends five questions you can ask before you begin writing a program.

1. Will more than one person use the program? If so, you have to consider issues of documentation, training and verification of data.

2. Will people need concurrent access? This is especially critical on multiuser machines such as Unix-based systems and the new IBM Personal Computer AT. Concurrency presents the delicate issue of record locking and backup.

3. Does a lot of money ride on this application? Critical programs should be written more carefully than ad hoc programs.

4. If the system were to stop working for any reason, would it force several people to stop working? Such applications must be debugged thoroughly to prevent snags.

5. Does the application involve transaction processing or formatted screens? If so, it requires structured implementation.

Ron Ross, editor of the "Data Base Newsletter," commented, "If the data supports a kind of decision making, then the application is not particularly dangerous. But if the data and systems work on a bread-and-butter level of data, then you had better stop and think twice about how you develop it."

Software Synthesis, Inc., a consulting firm in Oakland, Calif. "When it's time to add on to it, [the user] simply tacks on pre- or post-processing until it becomes unmanageable. And this doesn't show itself until two or three years later."

Most experts agree users make two other common mistakes: they rarely document and they don't back up data and programs. Of these, the documentation and its related training problem is the worst. "It's the number one problem," Rivers said. "When a system has evolved from nothing, it is usually completely undocumented. I see enough problems in a mainframe shop and they have manuals three inches thick."

Some companies face the spectre of users' demanding the leeway to maintain departmental data bases separate from corporate information. This could lead to duplicate data bases and incompatible data.

The issue often becomes apparent only when staff turns over, noted John M. Thompson, a vice-president at the consulting company of Index Systems, Inc. in Cambridge, Mass. "A program quite often becomes an integral part of how a function works," he said. "You get to rely on something and then the person leaves and nobody knows what the heck he did."

Even those who were using the system often know little else about it. "Users sort of leech everybody in the office, and that's how they get others using it," said Nunzio Guarneri, vice-president of systems planning and product design at Chase Manhattan Bank in New York. "We ask what happens if somebody new comes in and it turns out they're being taught by the department secretary."

Backup is also sloppy with most user-developed applications. Whereas DP departments are accustomed to copying their entire disk library weekly, departmental users often forget or ignore the need for backup. Like Dr. Johnson's noose, the need for such procedures rarely becomes apparent until it is too late. "When they've got a scratched diskette and you tell them there's no way you can read that data for them, then they start thinking about backup," Guarneri said.

Ferris added that inattention to backup can lead to making decisions on the basis of wrong data.

"On systems that don't have adequate backup, there are all kinds of problems with data getting out of date," he said. "The manager winds up using that data for critical company operations."

Most experts agree that, although the situation is increasingly coming under control, the problems presented by hidden applications have not yet begun to manifest themselves. An unscheduled new player in the game is the micro-mainframe link, an emerging technology that allows users to access the corporate data base and, in some cases, maintain data locally for uploading to central files.

Whereas critical reports have long been produced on the main-

frame by applications written under rigid standards, users are now asking that they be allowed to download data to their spreadsheets or data base managers and create those same essential reports. Even if the data contained in the documents is wrong, it is generally accepted as accurate because it is produced on a computer, Thompson noted.

Furthermore, some companies face the spectre of their users' demanding the leeway to maintain departmental data bases separate from corporate information. "If we allow people to write on the corporate data base we've got a whole new set of problems," Thompson said. "You're asking for duplicate data bases and in-

compatible data and who knows what else. This is a mess that is about to hit and it's one I haven't got too many answers to yet."

In situations in which data is being entered locally for uploading later, overlap and contention issues will arise before the data even gets to corporate headquarters, Rivers said. "You'll get multiple information from the same data and you'll run into conflicts where the data doesn't balance," he said. "It's not pulling the data down that's a problem. It's putting it back together that creates chaos."

What can MIS do to get a grip on these emerging problems before they get worse? The first step is to find out where the critical applica-

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USERS TRY THEIR HANDS AT STANDARDS

HARTFORD, Conn. — Sometimes it is the microcomputer users themselves who enforce standards for reliability and maintainability of programs. At United Technologies Corp. headquarters here, Bill Johnston, manager of the corporate reporting department, has set up a system that initiates those of many DP development functions.

Johnston manages a department of six accountants, all of whom work on IBM Personal Computers. The department's procedures help to ensure against duplication of effort and provide a library of available applications upon which the accountants can draw.

Before an accountant starts building an application, he meets with the manager and discusses what he wants to do and why. "If they can use something else that's already been built we try to identify that to avoid duplication of effort," Johnston said. He also

keeps an eye out for programs that will actually create work, such as those that merely replicate on the computer reports that are easily produced manually.

Accountants are free to build programs as they like. When the application is ready to enter production, however, the user is required to prepare a written document showing what the application is for, why it was written, what environment it uses, a description of procedural logic and macro and any other information that would be important to a new user, Johnston said. The documentation is submitted to Johnston's review.

"Upon approval, the program becomes a production diskette," Johnston said. "The diskettes are all backed up and stored centrally. We have a cross-reference book listing which applications are on which diskettes."

The department has em-

ployed these procedures for about eight months, with such success that other United Technologies groups have come from as far away as Fort Wayne, Ind., to observe the procedures. Johnston admitted that there was some initial resistance to the standards among the department's accountants, but said that as the scope and organization of the group's library has grown, so has acceptance.

Noting that the use of formal procedures is second nature to him, Johnston nevertheless added that he is somewhat of a maverick in this area. "Part of my review of different subsidiaries involves looking at how other accounting departments are doing this," he said. "I've been pretty shocked by it."

The major problems he sees are poor documentation and lack of backup. "The concept of backing up a disk is foreign to many people," he said. "In many cases, there's no documentation at all."

tion. "There's no question that these people sooner or later will bump into the limits of unintegrated data base design," he said. "It's just unfortunate that with the more powerful machines they're going to bump up against these limits even harder."

Perhaps the most important issue is that MIS must learn to tap into the informal networks that have sprung up among users who are developing applications. "We need the kind of partnership such that the users will come to the MIS departments as coaches rather than as the controlling enemy," Thompson said. "What happens now is that some guy puts through a financial projection program and mentions it to some other guy in the canteen. They form their own little user club-type networks, and they don't call up the MIS department if they have a problem. They call up the guy who showed them the program in the first place."

For users writing really critical applications, Rivers recommended an even stronger approach. "I think that person should be transported to the main location and given an overview of how systems are developed in large shops," he said. "Show him how to document, organize and keep to schedule. It may take a month or two, it's going to cost a lot of money. But if the application is important, it's worth it."

Gilllin is senior editor, software, for Computerworld.

tions are within the company and whether they need help. At United Technologies Corp. headquarters in Hartford, Conn., the corporate auditing staff is charged with identifying such applications in subsidiary companies and making sure that corporate standards for

security and documentation are applied. "I don't think there are many department-critical applications and the really big ones we are aware of," said Jerry Kelly, manager of MIS.

The thornier issue is how to balance the demands of a data-

hungry user audience with the security and integrity issues vital to corporate information. Data base authority Ross, who admits to teaching a "Machiavellian" approach to data base administration, believes users will eventually seek guidance of their own vol-

NEWS, Continued from Page 5

plane ride is taking off. That's fine, but once you're up there, you really want to do things right."

NOT FADE AWAY

It seems that it is better to be a jack of all office trades than the master of one. According to a report published by International Data Corp. (IDC) of Framingham, Mass., dedicated word processors are being squeezed out of the office both by low-priced electronic typewriters with enhanced memory and by multifunctional micros with WP capabilities.

IDC reports that, especially in the managerial marketplace, the appeal of dedicated machines is fading. This is happening even though these machines still are better at text editing, are easier to use and have more extensive vendor-supplied training programs than micros with add-on WP software. The compound growth of shipments of clustered WP systems will slow from about 35% this year, to 13% in 1988. Shipments of stand-alone systems are expected to plummet by 1988.

Clustered systems can still be justified for paper-intensive departments in large organizations such as government and in the legal and insurance industries, according to Douglas Gold, a senior

research analyst at IDC. He said that clustered WP systems are becoming more sophisticated in order to have a shot at the integrated office market. For smaller companies, however, a personal computer integrating WP as one application is the most cost-effective way to go. "Word processing is a software application now. It is no longer a box. People go out and buy a disk," Gold said.

IBM dominates the stand-alone market, with a 30% share of the shipments and 39% of the installed base. Companies such as Digital Equipment Corp., Exxon Corp., CPT Corp. and NEI, Inc. are nibbling away at that lead. Wang Laboratories, Inc. dominates the clustered market, controlling about 50% of the installed base; IBM is number two with 10%.

QA TURNAROUND

What a difference a year makes. In late 1985, both Data General Corp. and Digital Equipment Corp., the Massachusetts' minisuper and neighbors, were feeling the sting of a tightening market. Both had disappointing earnings figures as well as less than favorable reviews from industry analysts. DEC's fourth-quarter numbers were so bleak that the stock fell more than 30

points in a matter of days.

A little more than a year later, the picture for both companies is vastly brighter, with strong revenues and earnings figures for the year. Though the turnaround can be attributed to a number of factors (such as internal reorganizations and tighter controls), both DG and DEC point to successes in the QA market as the key.

Although DEC is much larger than DG, the companies have followed similar strategies to success in the office. Both have created umbrella office packages of software and communications capabilities (DEC's All-In-One and DG's CEO) based on their high-powered superminicomputer technologies.

David Lyons, vice-president and general manager of DG's Information Systems Division, pointed out that just as QA market was shifting its focus from word processing to integrated systems for the manager and professional, DG began shipping its CEO product. According to Lyons, DG was the first with such a package and it provided "a leadership position."

At DEC, the Office Information Systems Division has played a "key role" in the company's recent successes, according to Henry Ancona, product group manager of the division. Ancona

echoed Lyons' picture of the QA market. He pointed to the strengthening of DEC's VAX supermini line as a key to the turnaround and said the recent introduction of the long-awaited VAX 8500, the company's new top of the line mini gives DEC strong positioning in that market.

Consultants are more willing to credit QA as the key factor at DG, but tend to be more hesitant to say the same about DEC. George Colony of Forrester Research credited DG with making a quick internal transition from being a strict OEM dealer to a strong marketing-oriented enterprise. He said DG has successfully leveraged its minicomputer positioning along with CEO to offer "a very homogenous solution" in the office.

According to Colony, "If you dug deeply at DEC, I don't think you'd find that the office has keyed the turnaround." He believes DEC's traditional OEM business, along with products like the Microvax and VT200 terminals, are fueling the new-found success. "All-in-One has helped, but not that much," Colony said. Though he wouldn't disclose figures, Ancona refuted Colony's analysis and stated that All-In-One sales have been "the largest in the industry, including IBM Profs offering. CEO and Wang's WPPHus."

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TECHNOLOGY



DEC's LQ903

MAYNARD, Mass. — **Digital Equipment Corp.** introduced a series of software packages that link Decnet local and wide-area networks with IBM Systems Network Architecture networks and run on the full range of VAX-11 computer systems.

DDXF, a document exchange facility, costs \$1,500 (\$750 for a Microvax version). DMPF, a distributed host command facility, costs \$1,500. A printer emulator, PRE, is available in VAX (\$1,000) and Microvax (\$200) versions. Micro VMS routines for remote job entry, 3270 terminal emulation, application program interface, and gateway network management are priced from \$10 to \$400. DEC also introduced a word processor that can function as an integrated office terminal, and a low-level letter-quality printer.

The \$2,696 Decmate II comes with the same keyboard and monitor as the Decmate II Office Workstation, a smaller system unit including two 5.25-in. floppy diskette drives and WPS software. The software allows Decmates to

communicate with other Decmates. Dec multiuser systems, and external data bases. Options include a \$695 integral modem for communications at 300 or 1,200 baud, a \$395 auxiliary Zilog Z-80A microprocessor for adding Decapell and CP/M-based office applications and foreign language versions of WPS software costing \$500 for the Decmate II and included in the Decmate III.

The LQ903, a 130-petal daisy-wheel printer, is priced at \$1,385, prints 24 char./sec in 10-pitch Shannon text and 34 char./sec in 12-pitch triple-A text. It is available with an optional \$695 sheet feeder or \$245 tractor feeder from Digital Equipment Corp., Maynard, Mass. 01754.

MOUNTAIN VIEW, Calif. — **Vitalink Communications Corp.** and **Digital Equipment Corp.** announced a joint agreement to market or \$245 tractor feeder from Digital Equipment Corp., Maynard, Mass. 01754.

Translan connects several Ethernet or IEEE 802.3 local-area networks so that they appear as one large network providing transparent interconnection of all local-area network stations regardless of their specific higher level protocols. The product has eight satellite channels or terrestrial link ports and a port capacity of 224K bit/sec.

Translan will be serviced and supported by Vitalink and is available for \$19,450 from Vitalink Communications Corp., 1350 Charleston Road, Mountain View, Calif. 94043.

PALO ALTO, Calif. — **Hewlett-Packard Co.** unveiled two enhanced versions of its 150 Touchscreen Personal Computer featuring double-sided 710K-byte microfloppy disk drives.

The \$3,495 HP Touchscreen Personal Computer, with two double-sided 3.5-in. disk drives, provides 1.4M bytes of total storage. The HP Touchscreen Personal Computer Max comes with a single double-sided drive and a 15M-byte Winchester disk drive and costs \$5,495.



HP's 150 Touchscreen

HP introduced a number of other storage devices as well as two software products, HP Advance-Link (8245) and HP Message (8300), which reportedly make it easier for HP and IBM personal computer users to exchange files and communicate via electronic mail.

HP also unveiled two entry-level bundled systems featuring the HP 3000 Series 37 computer and five software packs for the bundled systems. The four-user systems configured with 1M-byte memory and either one or two 55M-byte disk drives are priced from \$45,310 to \$57,615. The software packs are priced at \$300 to \$32,500.

For more information, contact HP, 1800 Embarcadero Road, Palo Alto, Calif. 94303.

SAN JOSE, Calif. — **Keyword Office Technologies, Inc.** introduced a disk-to-disk conversion device that reportedly enables diskettes created on one word processor to be used in an incompatible word processing system.

The Keyword 7000, a menu-driven hardware and software system, works as a peripheral to IBM or IBM-compatible personal computers. The product reportedly can convert text processed by IBM's Displaywriter, Xerox Corp.'s 820 and Digital Equipment Corp.'s Decmate II and others. One page is converted in about 13 seconds, the vendor said. Keyword 7000 is available for \$9,995 from Keyword Office Technologies, Inc., 2047 Hamilton Ave., San Jose, Calif. 95125.

LOWELL, Mass. — A multi-tasking computer specifically designed for secretaries was unveiled by **Wang Laboratories, Inc.**

The \$2,395 Wang Office Assistant features a 12-in. nonglare



Wang's Office Assistant

tinting monochrome monitor, detached keyboard, 256K bytes of random-access memory, a 5.25-in. 360K-byte diskette drive and software, including Wang's proprietary multitasking operating system, text editing, WP Plus and unique forms generation. Options include a second diskette drive and a print sharing device, from Wang Laboratories, Inc., One Intra-lar Ave., Lowell, Mass. 01851.

RYE BROOK, N.Y. — **IBM** introduced a series of office programs for IBM Personal Computers and System/36 and System 370 computers along with its most powerful 4300 series processor, an entry-level 3080 series machine and enhancements to the Personal Computer line.

The IBM Office Systems Family consists of enhanced Displaywriter text processing programs and programs that reportedly permit the exchange of documents and messages among networks of Personal Computers, System/36 and System 370 gear. The programs will be available in the second quarter of 1985 for \$250 to \$3,000.

IBM also announced 31 software packages aimed for small and medium-size offices. The IBM Business Management Series, an accounting system, enables users to maintain information on sales, inventory and vendor and financial status.

The IBM Personal Decision Series generates spreadsheets, models, graphs, calculations and text processing and allows Personal Computer users to share information with IBM System/370, 30 series, 4300 and System/36 processors.

The primary programs of the Business Management Series cost \$695 each. Core packages of the Personal Decision Series cost from \$150 to \$300.

The 4381 model group 3 features dual central processors, 256K-bit dynamic random-access memory chips and an internal throughput rate of up to 1.7 times that of the model group 2. The 4381-3, with 5M bytes of main storage and 12 standard channels, will be available in the second quarter of 1985 for \$825,000. A channel and memory upgrade for the 4381-2 costs \$249,000.

The IBM 3205, a 14-in., 7-color display console for 4381 and 4361

FORUM, Continued from Page 4

the application and file levels. If a local-area network is to link different manufacturer's equipment to share peripherals, software and files, all operating systems on the network must interact. The most common way to accomplish this is to initiate an emulation task that allows one system on the network to emulate another system's operating system.

The process of emulating another operating system gives the user the ability to execute all functions of the system being emulated. His workstation looks like any other dumb terminal attached to the emulated system. Therefore, he can access the file manager, application software, printers and disk storage and can even send messages to other users on that system.

One disadvantage of terminal or task emulation is that when the user is in emulation mode, he must forfeit the functionality he has on his own system. In addition, when he creates a file in emulation mode, he cannot easily store that file in his own file system without first copying it or executing a conversion utility. Operating commands will also be

different and system performance will sometimes be sacrificed.

Of course, what we are all waiting for are gateway developments to allow equipment from many manufacturers to coexist in one network. Transferring files from one operating system to another has to some degree been resolved. What is just beginning to be understood is how to access applications that are supported on one operating system on the network, but that may not be available from our system.

Integration is still in its infancy, and the important role it will play on all future product developments is just beginning to be understood. For some user organizations, it may mean the products they have installed may never evolve into an integrated system. For some vendors, it may mean that their only choice may be to declare obsolete a product line that was once profitable. □

Rossi is associate editor of the Seybold Report and is a senior consultant at the Seybold Co., a major office automation consulting and publishing company based in Boston.

TECHNOLOGY

processors, costs \$2,895.

The 3063 model CX configured with central processing unit, 3063 processor controller, 3067 model 1 coolant distribution unit, 8M-bytes of main storage and 8 channels, will be available for \$630,000 in the second quarter of 1985, the vendor said.

The IBM PC AT/370, with 1.2M-byte diskette drive, 30M-byte fixed disk drive and 512K bytes of main memory is priced at \$9,795, and will be available in January, IBM said.

Enhancements to the 3270 PC include an application program interface allowing users to send data directly into a PC session without making programming changes in the host, and a 63,895 plasma display.

Two 3270 PC models with 6271 keyboard adapter and API are priced at \$5,990 and \$7,550 from IBM Information Systems Group, 900 King St., Rye Brook, New York 10573.

file server makes an IBM PC-XT the repository for all software in the network, allowing multiple users to run the same software simultaneously. A 9600 to 9600 PC file transfer package expands cross-controller transfer capabilities for the net and is available from Davox Corp., 4 Federal St., Billerica, Mass. 01821.

BOULDER, Colo. — Vianet, Inc. announced a local-area network software product that reportedly links all MS-DOS, PC-DOS and Unix-based microcomputers together.

Vianet offers a fully distributed architecture, application software compatibility and hardware independence, according to the vendor, and allows users access to all resources on the network. It is available for \$125 from Vianet, Inc., 5796 Central Ave., Boulder, Colo. 80301.

BILLERICA, Mass. — Honeywell, Inc. unveiled a Unix-based workstation targeted at engineering administration and support environments and a family of packaged office systems.

The Microsystem NX runs the Unixplus operating system, a licensed port of the Unix System III, with Berkeley 4.1 extensions. The 12M-byte version costs \$8,895; the 18M-byte model costs \$9,495.

The Office Management System 40, based on Honeywell's 16-bit mini, and the OMS 90, based on their 32-bit superminis, run under the Geos 8 operating system written in C. It reportedly has been ported to most major Unix hardware. The product also includes print spooling and a screen builder and costs from \$900 to \$4,000, depending on the processor, Unixplus Integration Systems said from Suite 500, No. 1 Galleria Tower, 13355 Noel Road, Dallas, Texas 75240.

NEW YORK — RCA Global Communications, Inc. unveiled an electronic mail service with access to the firm's Globcom domestic and international telex network.

WESTBORO, Mass. — Data General Corp. unveiled the Data General/One, a 10-lb portable that is reportedly compatible with the IBM Personal Computer and that runs MS-DOS, CP/M-86 and Xenix operating systems.



The DG/One

The DG/One features a liquid-crystal, bit-mapped 25 line by 80 col flat display, up to 512K bytes of user memory and up to two 3.5-in. micro-floppy disk drives of 737K bytes each and a full-size keyboard with 79 keys. The base system with 128K bytes of memory and a single disk drive costs \$2,895. The CEO Connection software package which allows users of the portable to access DG's Comprehensive Electronic Office system costs \$295 from DG Corp., 4400 Computer Drive, Westboro, Mass. 01580.

FOLSOM, Calif. — A voice mail system targeted for small and medium-size businesses was introduced by Genesis Electronics Corp. The Cindi 400 series consists of four models offering from four to eight ports, four to 16 hours of message storage and 128 to 512 user mailboxes.

The system is accessed via any Touchtone phone and gives offices with 50 to 500 telephones voice mail capabilities starting at \$83 per user, the vendor said.

More information is available from Genesis Electronics Corp., 103 Woodmere Road, Folsom, Calif. 95630.

DALLAS, Texas — Uniflex Integrations Systems introduced an integrated software package for Unix-based systems consisting of WP, spreadsheet, relational database and electronic mail.

Uniflex II, aimed for both OEMs and end users, is a menu-driven system written in C. It reportedly has been ported to most major Unix hardware. The product also includes print spooling and a screen builder and costs from \$900 to \$4,000, depending on the processor, Uniflex Integration Systems said from Suite 500, No. 1 Galleria Tower, 13355 Noel Road, Dallas, Texas 75240.

NEW YORK — RCA Global Communications, Inc. unveiled an electronic mail service with access to the firm's Globcom domestic and international telex network.

Reportedly operating on almost any type of computer, RCA Mail uses simple one-word English commands and allows users to be assigned different security levels. Charges for the system include a 5 cent per kilo-character transmission fee; a 64 to 814 per-hour usage fee (depending on the time of day) and a \$140 monthly fee for each user organization. RCA Global Communications, Inc. said from 60 Broad St., New York, N.Y. 10004.

ROCKVILLE, Md. — General Electric Information Services Co. announced its Disaster Recovery Services, aimed to protect Fortune 500 companies whose own computer facilities have been destroyed or disabled.

The Schenectady, N.Y., service facility contains Honeywell, IBM and Hewlett-Packard Co.

mainframes, peripherals, telecommunications links and office space. Subscribers can use the facility within 24 hours of notification of a disaster, the vendor said. Monthly fees range from \$1,000 to \$12,000 from General Electric Information Services Co., 401 N. Washington St., Rockville, Md. 20850.



Net/One Local Bridge

SANTA CLARA, Calif. — Ungermann-Bass, Inc. introduced a network bridge that reportedly increases the rate of data transfer between Net/One communications systems in the same geographical location by more than 600%. The Net/One Local Bridge forwards information from network to network or channel to channel on a per-packet basis at rates in excess of 1,000 packets per second, according to the vendor. The product consists of network access hardware, a Motorola M68000 microprocessor and is priced at \$9,850.

Software costs \$1,000 per bridge from Ungermann-Bass, Inc., 2560 Mission College Blvd., Santa Clara, Calif. 95050.



Kodak's CRT Print Image

ROCHESTER, N.Y. — A full line of 6-in., 5.25-in. and 3.5-in. flexible disk was introduced by Eastman Kodak Co.

The 8-in. disks will sell for \$5 single-sided and \$5.60 double-sided. The 5.25-in. disks cost \$3.85 single-sided, \$4.65 double-sided and \$6.60 double-sided with quadruple density. The 3.5-in. micro-floppies cost \$6.25.

Kodak also announced a line of instant slide products allowing users to make color slides from most CRT terminals. The Slide Cat line includes a 6339 slide film back, adapter cones for 9-, 12-, 13- and 18-in. monitors (\$40 to \$50), and a 675 slide mounter. The 35mm. Instagraphics color slide film can be processed and mounted in 15 minutes and costs about \$1.30 per frame from Eastman Kodak Co., 343 State St., Rochester, N.Y. 14650. ON

Banyan's Network Server

WESTBORO, Mass. — A virtual networking system, which handles file and peripherals management for up to four local-area networks, was unveiled by Banyan Systems, Inc.

Vines consists of the Banyan Network Server — a Motorola 68000-based, 32-bit computer running proprietary Unix-based system software. A low-end Vines system, with 512K bytes of main memory, 43M bytes of disk storage, a 60M-byte tape drive and software costs \$16,900 from Banyan Systems, Inc., 135 Flanders Road, Westboro, Mass. 01581.

BILLERICA, Mass. — Davox Corp. introduced four color workstations and enhancements to its Davoxnet local-area network.

The 2900 and 3900 series workstations feature multiprotocol capability, seven-color graphics and API text capability. The 2911 and 3911 data-only workstations cost \$5,600 and \$5,915 and the 2921 and 3921 feature integrated telephones and are priced at \$5,700 and \$6,015.

Davox also announced software options for Davoxnet. A \$995 PC

CALENDAR

Dec. 3-4, Tulsa, Okla. — **Managing Information Centers Effectively.** Contact: Thomas J. Blazquez, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

Dec. 3-5, Boston — **Conference On Control, Audit & Security Of DEC Systems.** Contact: MIS Training Institute, Inc., 4 Brewster Road, Framingham, Mass. 01701.

Dec. 3-5, San Francisco — **Data Base: A Manager's Guide.** Also, Feb. 4-6, Atlanta. Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

Dec. 4-5, New York — **New Technologies, New Solutions.** Also, Dec. 11-12, Palo Alto, Calif. Contact: The Yankee Group, 89 Broad St., 14th Floor, Boston, Mass. 02110.

Dec. 4-6, New York — **Computer Networking Seminars.** Also, Dec. 11-13, Boston. Contact: Technology Concepts, Inc., Old County Road, Sudbury, Mass. 01776.

Dec. 5-7, Boston — **Office Automation and the Technology Revolution.** Contact: Data-Tech Institute, 386 Franklin Ave., P.O. Box 569, Nutley, N.J. 07110.

Dec. 6-7, Boston — **Software Configuration Management.** Also, Dec. 10-11, Orlando, Fla. and Dec. 13-14, Washington, D.C. Contact: Education Foundations of the Data Processing Management Association, c/o Technology Training Corp., Department SCM, P.O. Box 3608 (3420 Kashiwa St.), Torrance, Calif. 90510-3608.

Dec. 10, Gaithersburg, Md. — **Local Network Technology Tutorial.** Contact: The Institute of Electrical and Electronics Engineers, Inc., Box 639, Silver Springs, Md. 20901.

Dec. 10-12, New York — **Personal Computers in Business: The Micro-Mainframe Connection.** Contact: National Institute for Management Research, P.O. Box 90403, Santa Monica, Calif. 90403.

Dec. 10-12, Toronto, Ont. — **A Workshop for the Newly Appointed Data Security Officer.** Contact: Computer Security Institute Educational Resource Center, 43 Boston Post Road, Northborough, Mass. 01532.

Dec. 10-12, New York — **Personal Computers in Business.** Contact: National Institute for Management Research Seminars, P.O. Box 3727, Santa Monica, Calif. 90403.

Dec. 10-12, New York — **Automating The Office: A Tactical**

Guide For Success. Contact: American Management Association, 135 W. 50th St., New York, N.Y. 10020.

Dec. 11, Gaithersburg, Md. — **Computer Networking Symposium.** Contact: The Institute of Electrical and Electronics Engineers, Inc., Box 639, Silver Springs, Md. 20901.

Dec. 12-13, Washington, D.C. — **National Office Automation Conference.** Contact: National Conference on People, Organizations and Office Technology, 572 Grand Ave., Englewood, N.J. 07631.

Dec. 13, Los Angeles — **Linking Microcomputers with Mainframes: Opportunities and Issues.** Also, Jan. 22, New York and Feb. 26, Chicago. Contact: Data-mation Institute, Suite 603, 331 Madison Ave., New York, N.Y. 10017.

Dec. 13-14, Toronto, Ontario — **Security In The Electronic Office: Micros, Word Processors and Workstations.** Contact: Educational Resource Center of Computer Security Institute, 43 Boston Post Road, Northborough, Mass. 01532.

Dec. 17-19, New Orleans — **Advanced Program IEEE First International Conference on Office Automation.** Contact: The Institute of Electrical and Electronics Engineers, Inc., P.O. Box 639, Silver Springs, Md. 20901.

Dec. 17-21, Washington, D.C. — **Internet Systems and Protocols.** Contact: Continuing Engineering Education, The George Washington University, Washington, D.C. 20052.

Jan. 21-25, Dallas — **Uniform.** Contact: Uniform, Suite 205, 2400 E. Devon Ave., Des Plaines, Ill. 60016.

Jan. 23-25, Washington, D.C. — **Reducing Telecommunications Costs Using Distributed Networks.** Contact: Continuing Engineering Education, The George Washington University, Washington, D.C. 20052.

Jan. 29-31, Washington, D.C. — **Communications Network.** Contact: Nancy Hedges, C.W. Communications, 375 Cochituate Road, Framingham, Mass. 01701.

Feb. 4-6, Atlanta — **Office Automation Conference.** Contact: Alfie, 1899 Preston White Drive, Reston, Va. 22091.

Feb. 16-20, Kauai, Hawaii — **International Software Update II.** Contact: International Microcomputer Industries Association, Suite 175, 21 Tunal Vista Blvd., Corte Madera, Calif. 94925.

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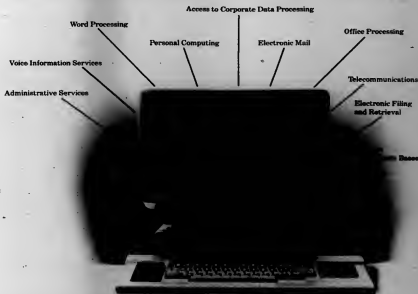
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